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A METHOD FOR CHRONOLOGICALLY ORDERING ARCHAEOLOGICAL DEPOSITS*

W. S. ROBINSON

THEORY

THE statistical technique of this paper is based upon the empirically established fact that over the course of time pottery types come into and go out of general use by a given group of people. It is further based upon the established fact that in cultures where chronology has been determined the differential use of types takes on a form illustrated in Figure 89. The data of this diagram are hypothetical, the purpose being merely to illustrate the present discussion.

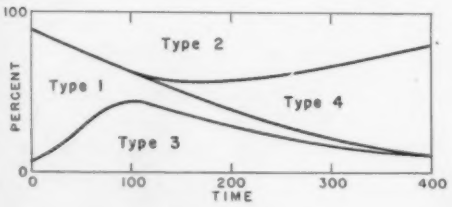

FIG. 89.

Figure 89 shows the differential use of four types of pottery over 400 years. At the beginning of the period type 1 is predominately in use, about 80 per cent of all pottery being of this type. The relative importance of type 1, however, shows a progressive decline throughout the period, so that at the end it is no longer used. Type 2, which was already in use at the beginning of the period, attains its maximum importance about the year 150, and thereafter undergoes a decline, though by the year 400 it still represents about 20 per cent of all pottery in use. Type 3 has just come into use at the beginning of the period, attains its greatest popularity around the year 100, and thereafter declines in importance. Type 4, on the other hand, first makes its appearance around the year 100, and increases in importance throughout the remaining years shown on the diagram.

The fact that types come into and go out of use in the lenticular fashion shown in Figure 89 has important implications for the archaeologist. Suppose he has a number of deposits, and that these deposits represent different points of time in the development of a people. Assuming that he already has the information given in Figure 89, what can he tell about the properties of these deposits? Reference to the figure will show that a deposit representing an early stage in this culture will have in it a preponderance of pottery of type 1, with small percentages of types 2 and 3. A deposit which represents an intermediate stage, on the other hand, will show a largest percentage of pottery of type 2, a somewhat smaller percentage of type 3, and relatively insignificant percentages of types 1 and 4. At a late stage, type 4 will bulk largest, with type 2 next, type 3 very small, and type 1 nonexistent.

More important than this, however, is the fact that deposits representing periods very close together in time will have percentage distributions of types which are very similar, while deposits with a considerable time span between them will have dissimilar percentage distributions. Deposits representing years 50 and 60, for example, will have similar percentages for all types, while deposits representing years 50 and 300 will have very different percentages for the four types. In other words, similarity of percentages of different types of pottery in use is evidence that the deposits are close together in time, and dissimilarity

* The research reported upon in this paper and in the succeeding one was supported by a joint grant to G. W. Brainerd and W. S. Robinson by the University of California at Los Angeles.

of percentages is evidence that the deposits are far separated in time. This is, of course, an argument from consequence to cause, and it is therefore properly suspect. Later in this paper, however, objective checks upon its validity are provided.

Let us now investigate the use to which this argument can be put. Suppose that we have on hand a number of deposits, and that we have reason to think that they represent different temporal periods in the development of a culture as measured by its differential use of types of pottery. Let us take as our research material the percentages of different kinds of pottery which appear in these deposits.

We now have a basis for deciding which deposits are close together temporally and which deposits are far separated in time. Those deposits with similar distributions of percentages ought to be temporally close, and those with dissimilar distributions ought to be widely separated. We can quantify these comparisons by devising a measure of how similar or dissimilar percentage distributions are for various pairs of deposits. Let us for the moment assume that we have done this, and let us call these measures *indexes of agreement* between the percentage distributions.

In terms of the index of agreement, we can now tell whether deposit I is closer in time to deposit II or to deposit III. If the agreement between the percentage distributions of I and II is greater than the agreement between deposits I and III, then deposits I and II are closer temporally than deposits I and III.

Let us now take a further step. Suppose we have seven deposits, which we shall label I, II, III, IV, V, VI, and VII, and that we have determined numerical values for the agreement between the percentage distributions of these deposits in all possible combinations of two. We have numerical indexes of how close together temporally all possible pairs of these deposits are. Let us assume furthermore that we already know the chronological order of the deposits—that the order is, from early to late, I, II, III, IV, V, VI, and VII—and let us now investigate the pattern which the indexes of agreement would show in this case.

We can array all the indexes of agreement between pairs of deposits by writing them in a square table, as in Table 16. The agreement of I with II would be written at the intersection of the row corresponding to I with the column corresponding to II, or, since the table is a symmetrical one, at the intersection of the row corresponding to II and the column corresponding to I.

TABLE 16.

	I	II	III	IV	V	VI	VII
I		6	5	4	3	2	1
II	6		6	5	4	3	2
III	5	6		6	5	4	3
IV	4	5	6		6	5	4
V	3	4	5	6		6	5
VI	2	3	4	5	6		6
VII	1	2	3	4	5	6	
	21	26	29	30	29	26	21

Consider now the row of agreement indexes for deposit I, the first row of Table 16. Deposit I is closest in time to deposit II, somewhat further removed from III, still further removed from IV, and furthest removed of all from VII. Therefore the index of agreement between I and II ought to be the largest index of the first row, the agreement between I and III the next largest, and so on down to the agreement between I and VII, which ought to have the smallest value in the row. In short, if the deposits are chronologically arranged along the margins of Table 16, the indexes of agreement ought to get progressively smaller from left to right along the first row. This has been indicated in Table 16 by writing the relative sizes of the indexes in the first row as 6, 5, 4, 3, 2, and 1.

Now consider the agreement indexes for deposit II, the second row in Table 16. Deposit II is closest in time both to I and III, and therefore the agreements between I and II and between II and III ought to be large, as indicated by the two 6's in the second row. Deposit II, however, is progressively further removed in time from III, IV, V, VI, and VII, and therefore the agreements of II with these deposits should progressively decrease in size, as indicated by the 5, 4, 3, and 2 which complete the second row.

The same argument may in turn be applied to each remaining row of Table 16, and results in the pattern of figures which is there given.

Let us now see what the consequences of this argument are. If the deposits are chronologically arranged along the margins of Table 16, the resultant pattern of agreement indexes will show a definite structure, in that as any row

is read from left to right the indexes will progressively grow larger up to the diagonal, and thence will progressively decline from that point on. The same progressive increase up to the diagonal and decrease after the diagonal will be apparent if any row is read in the opposite direction. Moreover, since the table is symmetrical about its diagonal, the same pattern will show for columns read from top to bottom or from bottom to top. In other words, if the deposits are chronologically arranged along the margins, the resulting table of agreement indexes will show high values clustering about the diagonal, with decreasing values as one goes away from the diagonal either vertically or horizontally.

Suppose now that we have seven deposits, labeled I to VII, and that we have determined numerical values for the agreement between the percentage distributions of these deposits in all possible combinations of two, just as before. We thus have numerical indexes of how close together temporally all possible pairs of these deposits are. But now let us assume that we do not know the chronological order of the deposits and want to determine that order.

We have seen already that *if* the deposits are arranged in chronological order along the margins of a table such as Table 16 the agreement coefficients in that table will show the pattern already described. This suggests that if we want to order the deposits chronologically we try rearranging the deposits along the margins until we approximate the desired arrangement of agreement coefficients in the interior of the table. If we can approximate that desired pattern, then we have strong presumptive evidence that the resulting marginal order is a chronological one.

Not all tables of agreement coefficients can be made to take the pattern of Table 16 by rearranging deposits along the margins. Unless the internal structure of Table 16 is latent in the data, rearrangement of the margins will not give that structure. A table in which agreement coefficients have been scattered at random, for example, will not yield the structure shown in Table 16 no matter how the deposits are rearranged. Therefore, if rearrangement of the deposits along the margins gives the desired structure, this fact is evidence of order among the data.

TABLE 17. PERCENTAGES OF EIGHT TYPES OF POTTERY IN THREE STRATIFIED TRENCHES

	DEPOSITS							
Type	IIA	IIB	IIC	IA	IB	IIIA	IIIB	IIIC
1	24.0	1.4	.2	11.3	.3	29.6	54.3	.0
2	66.8	.9	.0	.0	.0	.0	3.5	.0
3	1.3	.0	.2	3.8	.2	14.1	14.0	6.6
4	.0	.0	.0	1.3	.2	.0	1.8	3.3
5	.0	.0	.0	3.3	.5	.0	5.3	5.5
6	4.0	.0	.0	24.9	1.4	7.0	7.0	27.5
7	.0	97.7	99.3	52.6	97.4	.0	12.3	57.1
8	3.9	.0	.3	2.8	.0	49.3	1.8	.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The existence of order among the data, however, is not enough to guarantee that the order is a temporal one. It would undoubtedly be possible to imagine a situation in which the pattern of Table 16 would result where the causative agent was not time but some other factor such as geographic proximity. The most likely inference that can be made from Table 16 is that a temporal order caused the pattern there exhibited, but other inferences are possible also. Therefore, the pattern of agreement coefficients shown in Table 16 is merely presumptive and not conclusive evidence of an underlying chronological order of the deposits.

The presumptive nature of that inference, however, can be altered to practical certainty if appropriate collections of field data are available. All that is necessary is that deposits show chronological change through depth, so that a rudimentary chronology appears in each deposit. Each trench, that is, must have been segregated into two or more deposits, and it

TABLE 18. AGREEMENT COEFFICIENTS FOR THREE STRATIFIED TRENCHES—1ST ORDER

	IIA	IIB	IIC	IA	IB	IIIA	IIIB	IIIC
IIA		5 +	1 −	39 +	4 −	66 −	69 +	11
IIB	5		196 +	108 −	195 +	3 −	29 −	114
IIC	1 +	196		107 −	196 +	1 −	26 −	115
IA	39 +	108 −	107		110 +	50 −	82 −	172
IB	4 +	195 +	196 −	110		4 −	30 −	119
IIIA	66 −	3 −	1 +	50 −	4		101 +	27
IIIB	69 −	29 −	26 +	82 −	30 −	101		66
IIIC	11 −	114 +	115 +	172 −	119 −	27 +	66	

must be known which of these deposits is chronologically prior to the others. In this case the higher stratum will be known to be chronologically later than the lower. Each of these strata will be treated as a deposit by the method described above.

Table 18, for example, gives agreement coefficients for three trenches, labeled I, II, and III. Table 18 is based upon data from a Mani collection of Brainerd's. The deposits in this collection were taken stratigraphically, and the letters denote the order of the strata, A indicating the top stratum, i.e., the latest one, B indicating the next below, and so on.

The point of the present discussion can be illustrated best by Table 20, which is a rearrangement of the marginal order of Table 18 so as best to approximate the pattern of agreement coefficients which has already been shown to be presumptive evidence of chronological sequence.

Table 20 shows an almost perfect agreement with the internal pattern illustrated in Table 16. What we are concerned with here, however, is not that pattern, but rather the order of the deposits along the margins of Table 20. That order, as we have seen, is presumptively a temporal order. However, the use of chronologically sequenced deposits now allows us independently to check that presumptively temporal order. We know that for any one trench the deposit labeled A is later than the deposit labeled B, and so on. If that presumptively temporal order along the margins is a genuine temporal order, then for every trench the deposits should appear in the same alphabetic order, and that order should be either A, B, C, . . . or . . . C, B, A.

TABLE 19. AGREEMENT COEFFICIENTS FOR THREE STRATIFIED TRENCHES—2ND ORDER

	IIIA	IIIB	IIC	IB	IA	IIB	IIIC	IIA
IIIA		(101) +	1 −	4 −	50 +	3 −	27 −	(66)
IIIB	(101)		26 −	30 −	82 +	29 −	66 −	(69)
IIC	1 +	26		(196) +	(107) −	(196) +	(115) +	1
IB	4 +	30 +	(196)		(110) −	(195) +	(119) +	4
IA	(50) +	(82) +	(107) +	(110)		(108) −	(172) +	(39)
IIB	3 +	29 +	(196) −	(195) −	(108)		(111) +	5
IIC	(27) +	(66) +	(115) +	(119) +	(172) −	(111)		(11)
IIA	(66) +	(69) −	1 +	4 +	39 −	5 +	11	
	252	403	642	658	668	650	624	195

TABLE 20. AGREEMENT COEFFICIENTS FOR THREE STRATIFIED TRENCHES—3RD ORDER

	IIA	IIIA	IIIB	IA	IIIC	IB	IIB	IIC
IIA		(66) −	(69) +	39 +	11 +	4 −	5 +	1
IIIA	(66)		(101) +	50 +	27 +	4 +	3 +	1
IIIB	(69) +	(101)		82 +	66 +	30 +	29 +	26
IA	(39) +	(50) +	(82)		(172) +	(110) +	(108) +	(107)
IIIC	(11) +	(27) +	(66) +	(172)		(119) +	(111) −	(115)
IB	4 ○	4 +	30 +	(110) +	(119)		(195) −	(196)
IIB	5 −	3 +	29 +	(108) +	(111) +	(195)		(196)
IIC	1 ○	1 +	26 +	(107) +	(115) +	(196) ○	(196)	
	195	252	403	668	624	658	650	642

Inspection of Table 20 shows that this is precisely the case. Reading along the top, IIA appears to the left of IIB, and IIB appears to the left of IIC. IIIA likewise appears to the left of IIIB, and IIIB to the left of IIIC. And finally IA appears to the left of IB.

Now if the order along the margins of Table 20 were not chronological, the deposits as arranged by that marginal order would not show chronological ordering within each trench. The fact that the marginal order puts the chronologically ordered deposits into their correct chronological order leads overwhelmingly to the conclusion that the marginal ordering is by chronology.

Testing by stratified deposits carries another advantage too, in that it shows the direction in which chronology runs along the margin of the table. In Table 20, every deposit A is chronologically later than its corresponding deposit B. Since all A's lie to the left of their corresponding B's in Table 20, the deposits at the left of the table (reading across the top) must be later than the deposits at the right.

APPLICATION

THE AGREEMENT COEFFICIENT

The basic data to which this method is applied consist of a table showing the distribution of different types of material for a number of archaeological deposits, preferably stratigraphically collected. Such a table is given as Table 17, which shows the percentages of different pottery types appearing in three Mani trenches studied by Brainerd. The trenches are labeled I, II, and III. The deposits were stratigraphically collected, and the strata are denoted by A, B, and C — A representing the top

or most recent stratum, B the next stratum underneath, and C the bottom or earliest stratum.

The selection of types is essentially an archaeological problem and is discussed in the following paper by Brainerd. Here it will be assumed that the types have already been settled upon, and that the only problem remaining is that of ordering the deposits chronologically.

The basic tenet of this method is that deposits which are close together in time will have similar percentage distributions, and we therefore need a coefficient to measure the similarity of percentage distributions such as those in Table 17. Ordinarily, one uses the Pearsonian correlation coefficient for measuring the similarity between paired series of numbers such as these. Unfortunately, however, the Pearsonian correlation is not a useful coefficient here, because of its sensitivity to extreme values.

The data of Table 17 are typical of the data which one gets from archaeological deposits. In any one deposit there is usually one relatively large percentage and a number of very small ones. This means that the scatter diagram of one deposit plotted against another tends to have a number of points in the lower left corner and one point in the upper right corner. This results in a very large correlation coefficient, regardless of whether the two large percentages are approximately equal or are very different. In using Pearsonian correlations with this kind of data, one finds that the correlations are all so large and so homogeneous in value that they do not adequately distinguish between series showing very different degrees of agreement. It is therefore *necessary to devise a coefficient of agreement* for the specific end in view here.

What is needed is a measure of the similarity in the percentage distributions of two deposits. Such an index is most easily defined in terms of lack of agreement between the two percentage distributions. Consider, for example, deposits IA and IIIA in Table 17. The percentage of type 1 pottery in deposit IA is 11.3, whereas the percentage of type 1 pottery in IIIA is 29.6. The lack of agreement between the two percentages is merely their difference, or 29.6–11.3=18.3. Similarly, the disagreement between the percentages of type 2 pottery in IA and IIIA is 0.0–0.0=0.0. In a similar fashion one can determine the lack of agreement between each of the remaining six pairs of percentages.

In measuring the lack of agreement between two distributions, we are not concerned whether the percentage for one deposit is larger or smaller than the percentage for the other. We are concerned merely with the fact that they differ. Hence in getting a measure of the total lack of agreement for all pottery types it seems reasonable merely to add the pair differences without regard to sign. By so doing we then have a measure of the total disagreement between the two percentage distributions.

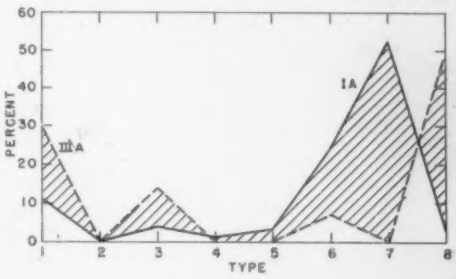

FIG. 90.

This measure of total disagreement between two series has a simple geometrical interpretation. In Figure 90 are plotted the percentage distributions for deposits IA and IIIA. Lack of agreement is shown by the fact that the two lines are not identical, for if the percentages were the same for all eight types of pottery the two lines would coincide. The less the lines tend to coincide, the greater the disagreement. The degree to which the lines tend not to coincide is measurable by the area included between them, i.e., the shaded area in Figure 90, and this is precisely the sum of all the pair differences taken without regard to sign.

Now all that is necessary is to turn the measure of total disagreement into a measure of agreement. The maximum value which the disagreement between two series can take is 200. If we subtract the total disagreement between the two series from 200, i.e., determine the complement of the total disagreement, we will have a measure of the agreement between the series.

Rearranging the Deposits

In applying this method the major problem from the standpoint of technique is to find an efficient way of reordering the deposits so as to approximate the desired internal pattern of agreement coefficients. This procedure can to some extent be codified.

The procedure begins, of course, with a table of agreement coefficients for which the marginal order of deposits is entirely arbitrary. Such a table is given here as Table 18, which shows the agreement coefficients for a Mani collection of Brainerd's. In this table, trench II has been placed first on the margin, trench I second, and trench III third, and the stratigraphically collected deposits within the trenches have been placed in alphabetic order. The problem is now to rearrange the deposits so that the agreement coefficients will show the pattern which is wanted.

What is needed first is a simple criterion by which to assess the effect of a given rearrangement of deposits along the margin. This is provided by the signs of the row-differences throughout the table. If the agreement coefficients of Table 18 already had the desired pattern, the values in any row read from left to right would grow larger up to the diagonal and would then decline in value after one crossed the diagonal. The extent to which the values actually show this pattern is shown by the signs of the row-differences, reading left and right from the diagonal. These signs are given in Table 18, and would all be positive if the agreement coefficients showed the desired pattern exactly. A criterion by which one can determine the degree to which the agreement coefficients fit the desired pattern is therefore the number of negatively signed differences. The smaller the number of negative signs, the closer the approximation to the desired pattern. In any single analysis, since the number of deposits is constant, merely the number of negatively signed differences may be used. If comparisons between different analyses involving different numbers of deposits are desired, the proportion of the signs which are negative can be used. There are always (n-1) (n-2) such signs in a table for which there are n deposits. In Table 18 there are 25 negative signs, and the total number of differences is (8–1) (8–2)=42, so that 60 per cent of the signs are negative.

Assume now that Table 18 is given, the marginal order of deposits being entirely arbitrary. What is needed is some routine way of rearranging the marginal order so as to lead quickly to the desired internal pattern of agreement coefficients. There is such a way, based upon a more or less incidental consequence of the pattern shown in Table 16. In discussing Table 16 previously, we considered only the internal pattern of agreement coefficients. However, if the deposits are chronologically arranged along the margins of the table, the totals for the rows or columns will show a pattern also. Beginning at either end of the chronologically ordered series, the totals will rise progressively to a maximum, and then will decrease progressively to a minimum at the other end of the series. This pattern is shown by the totals for Table 16, which is hypothetical, and also by the totals for Table 20, which is a chronological ordering based upon real data. The reason for this pattern of the marginal totals is simple: a deposit in the middle of the series is on the average closer in time to all the deposits than one which is at either end. Therefore its agreement indexes are on the average higher than the indexes for a deposit at either end of the series.

The first step in rearranging the deposits along the margins of the table consists merely in so ordering the deposits that their totals will show the ascending-descending pattern which would be expected from a chronological ordering. The result of doing this to Table 18 is shown in Table 19, in which the deposits have merely been rearranged so that their totals show an ascending-descending order. No attempt was made in the rearranging to put the deposits in such an order as to approximate the desired internal pattern of agreement coefficients, though this could have been done to some extent at the same time with a table this small. It is apparent that even this purely mechanical rearrangement of the marginal order results in a considerably better approximation to the desired internal pattern of agreement coefficients, for the number of negatively signed differences is reduced from 25 to 16.

The second step in rearranging the deposits consists in making relatively gross adjustments of the marginal order so as to bring the internal arrangement of agreement coefficients into better agreement with the desired pattern.

This is most easily done at this stage by ignoring the finer distinctions between values of the agreement coefficients and concentrating on their relative sizes. We have found it useful at this stage to proceed in the following way: After the deposits have been initially reordered so that their totals show an ascending-descending pattern, as in Table 19, we then encircle in each column those agreement coefficients having the largest values. It appears to be most efficient to encircle half of the coefficients in each column, as in Table 19.

Now if the agreement coefficients exhibit the desired internal pattern, the encircled coefficients will exhibit a pattern also. They will concentrate around the diagonal of the table, and will not appear in the lower left and upper right corners. In addition, there will be a tendency for the encircled values to fall below the diagonal in the upper left corner of the table, and to fall above the diagonal in the lower right corner. This tendency is illustrated in Table 20, which represents the final rearrangement of Table 19, although the pattern is somewhat obscured because of the small number of deposits used in the illustration. The desired pattern of encircled coefficients is much better illustrated when more deposits are involved, as in Table 21, which shows a late stage in the rearrangement of a Kabah collection made by Brainerd.

With the larger half of the agreement coefficients encircled in each column, it is now relatively easy to see the probable effects of rearrangements in the marginal order of deposits. In Table 19, for example, deposit IIA is obviously out of order because of the appearance of encircled values in the upper right corner, which suggest that IIA ought to be moved to the left side of the table, possibly even to the left of IIIA. In following through this procedure, a new table would then be

TABLE 21. A LATE STAGE IN THE REARRANGEMENT OF A KABAH COLLECTION *

	II	VII	IA	XIA	IB	XB	IX	XA	XIB	VIII	IVA	VB	VA	VIB	VIA	III	IVB
II		92	132	104	101	84	95	88	94	92	81	72	55	46	44	51	49
VII	92		105	124	107	116	108	113	106	91	107	92	84	82	60	78	64
IA	132	105		153	145	135	146	138	150	128	135	126	110	100	91	102	105
XIA	104	124	153		144	142	150	151	168	140	134	121	107	113	100	76	99
IB	101	107	145	144		147	166	167	154	159	146	150	139	147	133	131	114
XB	84	116	135	142	147		164	169	166	157	155	154	142	132	129	119	131
IX	95	108	146	150	166	164		181	170	168	167	164	148	140	138	139	137
XA	88	113	138	151	167	169	181		168	158	167	160	151	143	140	143	133
XIB	94	106	150	168	154	166	170	168		153	146	149	129	129	128	120	121
VIII	92	91	128	140	159	157	168	158	153		147	159	149	148	143	134	139
IVA	81	107	135	134	146	155	167	167	146	147		153	152	143	127	152	157
VB	72	92	126	121	150	154	164	160	149	159	153		178	154	164	149	152
VA	55	84	110	107	139	142	148	151	129	149	152	178		171	172	166	161
VIB	46	82	100	113	147	132	140	143	129	148	143	154	171		175	152	145
VIA	44	60	91	100	133	129	138	140	128	143	127	164	172	175		145	139
III	51	78	102	76	131	119	139	143	120	134	152	149	166	152	145		154
IIB	49	64	105	99	114	131	137	133	121	139	157	152	161	145	139	154	

* Bottom line of table, now labelled IIB, should be labelled IVB.

made in which the marginal order along the top would read IIA, IIIA, IIIB, and so on. In practice, and particularly with larger matrices, two or three or four deposits are conveniently changed in position at one time, especially in the earlier stages, and this cuts down materially the number of tables which have to be copied.

Progress in the rearrangement process can be checked by using the criterion of the number of negatively signed differences. This criterion must not be applied too rigidly, however, for often a rearrangement which is in the right direction will result at first in a slight increase in the number of negatively signed differences. It does so, for example, when deposit IIA is moved to the left of IIIA in Table 19. It is the trend of the number of negatively signed differences which is important.

The final stage in the rearrangement process is the final adjustment of the marginal order of deposits by recourse to the actual values of the agreement coefficients and their differences. This is necessary at a later stage in the rearrangement of a large matrix than in the rearrangement of a small one. In rearranging a small matrix, in fact, it is often profitable to begin the process by considering the actual values of the coefficients.

In this final stage, if very precise results are to be obtained, it may be necessary to use a more sensitive measure of the agreement between the actual and the desired pattern of agreement coefficients than is provided by the number of negatively signed differences. There appears to be no good theoretical ground upon which such a measure can be based, but we have used one which serves very well in practice. It seems obvious that the size of a difference ought to count in assessing the agreement between a given matrix and the desired one as well as the sign of the difference. A negative difference of one or two units is obviously not as damaging as a negative difference of a hundred units. For very precise work we therefore use such an index of disagreement between the given and the desired matrix. We square all the negative differences, and then express the sum of these squares as a fraction of the sum of the squares of all differences, positive and negative together. The reason for using the squares of the differences is that the squares give proportionately more importance to larger differences.

As illustration this more sensitive index of disagreement between the actual and the desired matrix has been computed for Tables 18,

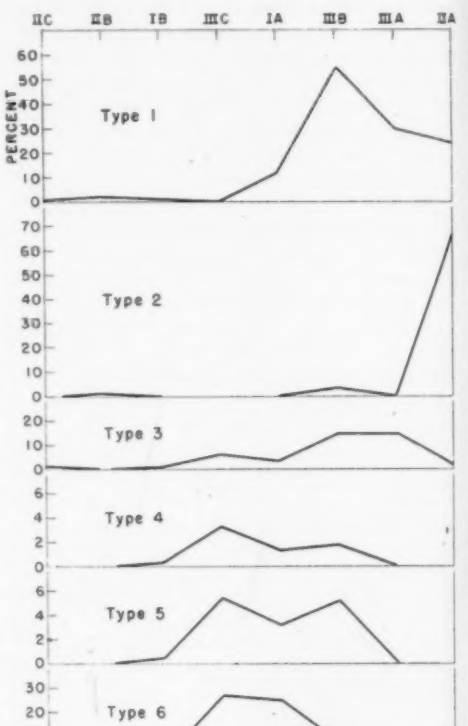

FIG. 91.

19, and 20. For Table 18, the sum of the squares of the negative differences is 35 per cent of the sum of the squares of all differences. For Table 19, the sum of the squares of the negative differences is 16 per cent of the sum of the squares of all the differences. For Table 20, which represents a phenomenally close approximation to the desired matrix, the sum of the squares of the negative differences is but 0.03 per cent of the sum of the squares of all differences.

THE FINAL ORDER

Once a final order of deposits has been determined, the only remaining step is to reorder the original percentages of Table 17 according to that final order. The result of applying the marginal order of deposits from Table 20 to the original percentages of Table 17 is shown in Figure 91. In Figure 91 the deposits as ordered by Table 20 are laid off on the horizontal axis, and the percentage of each type of pottery is plotted on a vertical axis.

There are eight graphs in Figure 91, one for each type of pottery. It is apparent that each type shows the lenticular shape known to be characteristic of this type of data when correctly ordered by chronology. At the beginning of the period covered by the deposits analyzed type 7 was predominantly and almost exclusively in use. The importance of type 7 declined throughout the period, however, and it does not appear at all in the two latest deposits. Types 4, 5, and 6 are characteristic of the central portion of the period, and types 1 and 8 of the latest portion. Type 2 was just coming into use at the very end of the period. The very small amount of it appearing in deposit IIB is probably due to mixture with IIA.

The orderings in Figure 91 are obviously statistically significant. However, in less clear instances it may be necessary to test the final ordering for each type of pottery for its statistical significance. This can be done by testing each ordering for randomness. There are a number of such tests available, but probably the simplest one to use, especially if the number of deposits is at all large, is that developed by Wallis (in W. Allen Wallis and Geoffrey H. Moore, "A Significance Test for Time Series Analysis," *Journal of the American Statistical Association*, 36, 1941, pp. 401-409).

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THE PLACE OF CHRONOLOGICAL ORDERING IN ARCHAEOLOGICAL ANALYSIS*

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THE article which precedes this one describes a statistical technique for the chronological placement of archaeological artifact collections. The purposes of this paper are first to describe the *rationale* of archaeological analysis under which the data and problem as presented to Robinson were formulated, and upon which the validity of his solution therefore depends, and second to describe analytic and interpretive work which I have based upon his results.

The introductory section of this paper is a defense of archaeological artifact typology as a primary tool of analysis, and of mathematical and graphic working techniques in the chronologic placing of material. To the archaeologists who approve of and constantly use these techniques I apologize for my verbosity but plead that in many reports the method of sequencing is given briefly and sometimes nearly apologetically. To those ethnologists who find in trait lists at best a superficial method of culture study I plead a special purpose for typology in archaeological analysis.

TYPOLOGY IN ARCHAEOLOGICAL ANALYSIS

During the last few years there has been a growing and proper demand that archaeologists extract from their artifacts more reconstructions of past cultures, more data that will add historical perspective to ethnology. Steward and Setzler (1938) present an example of a well-reasoned plea for broader archaeological interpretation. In sympathy with this demand there

* See footnote on p. 293.

has been a laudable tendency among archaeologists to provide more complete and carefully considered culture reconstructions. These reconstructions have usually taken the form of amplified descriptions of archaeological phases or "horizons." The current forms of archaeological typology have been under sharp criticism during the last few years. From these two critical trends has emerged in some minds the conclusion that archaeologists should forego the barren escapism of typology and proceed directly to the goal of culture reconstruction or, a less radical cu[illegible], that whatever typology is used should of itself provide a functional description of the culture. To my mind these proposals reflect a misunderstanding of the fundamental purpose of archaeological typology.

The tracing of culture change through time by careful documentation is as major a responsibility of the archaeologist as is culture horizon description; he is a culture historian as well as an ethnographer. Although his competence in the former field has by many been taken for granted, actual performance has often not been exemplary. Human migrations have certainly too often been invoked to explain culture change. Such major errors as the misunderstanding of the Basketmaker-Pueblo transition (Brew, 1946, pp. 32-85) and of the interrelationship of the central and northern Maya groups (Brainerd, 1948) have come from failures in historical reconstruction. Some errors of this type might have been avoided if more attention had been given to careful chronologic sequencing, to working through time as a continuous variable rather than by the limitation of description to successive chronologic cross sections. Other errors have been perpetuated unduly through the uncritical acceptance as fact of theoretical interpretations of culture sequence based on thinly distributed data.

The archaeologist has a unique chance to determine empirically how preliterate cultures came to be as they were. His use of technical procedures in reaching an ever more finely drawn chronological scale needs no apology; these are prerequisite to his determination of culture change through time, a subject in which he should be able to work with unique authority.

The materials which come to the hand of the archaeologist have invariably been made by man during an interval of time, and only after these have been sequenced can he write culture history, or even know when he has arrived safely at the way station of horizon description. Few archaeologists would question the advisability of formulating horizon descriptions, both because of the insight these give into cultural configurations and the opportunity they afford for direct comparison with the richer horizon descriptions available from the ethnographers. But the techniques of close chronological placement, if not systematically explored and improved, can prejudice all future work toward culture reconstruction from archaeological remains.

The prime working tool of the archaeologist in the formulation of his time-space framework is typology. The effects of the time factor can be isolated by stratigraphic or seriational analysis of types. This procedure is a specialized archaeological technique best applied in the first stages of the work.[1] The impatience of many ethnologists with detailed archaeological typology is easily understandable. In studying a human group the ethnographer can follow the direct procedure of describing the organization, conventions, and techniques of a society, appending descriptions of the material results of its arts and crafts. The archaeologist, attempting to apply inductive methods toward reconstructing cultures from their material remains, produces a monograph the bulk of which provides frustrating reading to the ethnologist. He finds the material culture descriptions unduly detailed, organized in an incomprehensible manner, and including data extraneous to even his most exacting needs and interests. Failing to realize the purpose of archaeological typology, he is apt to suspect the archaeologist of an interest in objects rather than in their makers.

There is adequate reason for nonfunctionally oriented artifact typology, even that of the most detailed sort, if it is objectively formulated and serves the purpose of construction of the

[1] Although these dicta will seem self-evident to most archaeologists, they are far from universally accepted. The Midwestern Taxonomic system defers chronology for later consideration, while Taylor (1948, p. 147) defers comparative and taxonomic studies until the "culture types" existing in the archaeological material have been "separated inferentially on the basis of cultural cohesiveness." Although I do not completely understand his statement, this sequence of procedure would seem to favor the making of culture reconstructions before the establishment of the time-space framework.

necessary time-space framework. If a chronologic sequence can be constructed by procedures unconnected with cultural interpretation, and if the process provides its own proofs of validity, it gains authority thereby. The cause and effect relationships subsequently reconstructed will then be supported by independent chronologic anchorage and are sure to be unaffected by circular reasoning on the part of the investigator.

Such an objective technique is completely feasible, as may be demonstrated by analogous techniques developed in geological sequencing and in chromosome mapping. Archaeological types may properly be formulated, as indeed they usually are (Krieger, 1944, pp. 277-9; Rouse, 1939, pp. 25-6), by noting which objectively describable artifact traits occur often in combination in single artifacts. The frequencies in artifact collections of types thus formulated can serve as the working material from which chronological sequences may be built. Furthermore such objectively determined types may reasonably be assumed to represent cultural standards (Rouse, 1939, pp. 18-23) which may be later utilized as parts of the culture description.

The value of an initial typology should not be judged by what it directly tells of the culture to be investigated but by the sensitivity and reliability of the time-space framework which it can be made to yield. Time moves by imperceptible increments through the archaeological sequence. The more finely drawn and objectively determined the chronology, the more delicate and authoritative can be the insight which it provides into the interpretation of changes undergone through time.

THE PROBLEM OF CHRONOLOGICAL ORDERING

The problem of objective and closely controlled determination of chronological sequences from frequencies of types in collections or samples is the subject of the experimental work here described. I have long felt that this type of determination can most logically be done by mathematical procedures using the largest possible number of types or trait assemblages. It is my contention that the reasoning so often advanced against necessarily simplified mathematical formulations of complexly interrelated cultural factors does not apply here to the extent of invalidating a chronological sequence. I believe this claim is borne out by the independent checking of sequences established by Robinson's ordering techniques described in his accompanying article.

It should perhaps be pointed out here that statistical treatments of chronological ordering are not subject to certain logical complexities, inconsistencies, and uncertainties of judgment inherent in the mathematical formulation of measures of similarity between regional cultures. Variations undergone by a culture through time, although likely as complex in their causation as the regional variations found in contemporary cultures, can be arranged in a linear order which is not varied by differences of emphasis or judgment. American culture of 1900 A.D. may be related to that of 1950 A.D. by use of a linear time scale which is in itself not subject to the questions of viewpoint and interpretation which enter so profoundly into an assessment of the relationship of, for example, modern English and American cultures. Variations in judgment as to the relative importance of kinds of cultural differences can alter profoundly estimates of similarity between contemporaneous cultures, but should not alter sequential orderings of artifact material along a time axis. Although the *sensitivity* of time differentiation in an archaeological sequence is directly dependent upon the judgment of the typologist, its *ordering*, if objectively arrived at, should not be affected thereby.

If the above scheme of thought be acceptable we may start our problem with a described and tabulated mass of archaeological material which has been segregated into the divisions which will be used as our criteria in the formation of a time-space framework.

The nature of these divisions does not bear directly upon the scheme of analysis proposed here; although those employed in this problem are of the commonly used hierarchic sort whose smallest division is often called a type[2] the subdivisions used may equally well crosscut hierarchic classifications.[3] A single important

[2] Such types are not so restricted in definition as Krieger's; they will, for example, not meet Krieger's qualification (1944, p. 285) of having demonstrated chronologic or regional significance, since such proof is one of the by-products of our procedure.

[3] Cf. Rouse's (1939, pp. 11-12) *modes*, and Brew's (1946, p. 46) plea for "more" classifications.

qualification must be met by the sorting criteria used. Each must be of such complexity in number and organization of attributes that the presence of an artifact belonging to it suggests that its maker lived in the same cultural milieu as that of makers of all other artifacts classified into the same sorting group; thus all artifacts classified under one group must have been made at approximately the same time and place. This hypothesis is tested for each group by the subsequent analysis, and is empirically proved for various groups if the analysis is successful. These sorting groups will henceforth in this paper be called *types*.

Types are normally encountered in artifact *collections*. A collection is defined as a group of artifacts which were found together, and therefore are suspected of having been made at approximately the same time and place. The *types* associated in collections are listed quantitatively, and the frequency of occurrence of the various types defined in a collection of any size may thus be computed.

The analytic technique whereby collections of artifacts may be placed in a time-space framework is based on the concept that each type originates at a given time at a given place, is made in gradually increasing numbers as time goes on, then decreases in popularity until it becomes forgotten, never to recur in an identical form.[4]

If, in a mass of cultural material from a single region, a series of artifact types follows the course outlined above, each originating more or less independently of another, the corollary may be drawn that if a series of collections comes from a culture changing through time, their placement on the time axis is a function of their similarity; collections with closest similarity in qualitative or quantitative listing of types lie next to each other in the time sequence. This corollary allows a "seriation" or ordering of collections to be formed which, if time be the only factor involved, must truly represent the temporal placing of the collections,[5] although determination of the direction early to late must be obtained by other means.[6] Stratigraphic excavations have abundantly confirmed this general disposition of artifact types through time in archaeological deposits.[7]

ROBINSON'S ORDERING TECHNIQUE

Brainerd posed to Robinson the problem of obtaining a mathematical measure of similarity among collections which would depend upon the comparative frequencies of a considerable number of types common to the collections. Since the variation among the collections to be analyzed was suspected to be principally chronological, an objective method for the seriation or ordering of the collections on the basis of these measures of similarity was desired.[8]

[4] Cf. Rouse (1939, pp. 14-15). New types do not normally originate at identical times save by chance. If a series of collections shows mass displacement of types at a single time, cultural displacement by conquest or other means seems indicated. This corollary has been much overworked in the past (as in the Basketmaker-Pueblo I transition) by reconstructing from too widely spaced series of collections.

[5] Spier (1917) first published a mathematical formulation of a chronological sequence using the above-described principle. The sequence arrived at by Spier seems to have been previously formulated by inspection by Kroeber (1916). Formulation of sequences by the principle of placing collections or artifact styles or types in order of closest similarity has been done, using a wide variety of techniques, by many workers, among whom Kidder (1915), Kroeber (1930), Olson (1930), Ford (1938), Rouse (1939), Beals, Brainerd and Smith (1945) and Ford and Willey (1949), may be cited as examples. Several have qualified their orderings as provisional, awaiting establishment or disproof by stratigraphy.

[6] Spier knew historically which end of his sequence was late. Stratigraphic placement of two or more points will also give direction. A technique for this determination from the data of the seriation itself forms part of the present study.

[7] Nelson (1916) first demonstrated such a stratigraphic sequence to Americanists. Kidder (1936) was able to check his seriational results (1915) by later stratigraphic excavation.

[8] Robinson's statistical techniques show certain obvious similaries to those used in ethnological studies. He was unfamiliar with these at the time of his work. (See Driver and Kroeber, 1932; also see Kluckhohn, 1939, for a bibliography and evaluation of such studies.) Kroeber, perceiving the similarity in ordering of data between ethnological trait lists and the trait lists employed in archaeological studies using the Midwestern Taxonomic system, applied the ethnological statistical method to a series of archaeological sites, getting results similar to those made by previously used inspectional

Brainerd's immediate need for this sort of a method was to aid in the formulation of a more closely defined chronology for the Maya ceramics of the Puuc region in Yucatan. The numerous collections made by the Carnegie Institution in Puuc ruins had failed to yield evidence of ceramic change when analyzed by Brainerd's inspectional techniques, although considerable variation of types through the collections from single sites was evident. An accurate objective serial placement of these collections in chronologic order was desirable to allow the study of the development of the associated architecture and other facets of the culture as well as of the ceramic development. Detailed results of the statistical analysis will be presented in Brainerd's subsequent monographs. This article is confined to method and theory.

Robinson, a sociological statistician, showed an immediate enthusiasm in the problem, tempered only by considerable distrust of the sort of data furnished him. His delighted comment that the results are more definitive than any he has obtained in several years may perhaps be taken to demonstrate the ease of chronologic analysis as compared to that of the interaction of factors in contemporaneous society.

As may be seen from Dr. Robinson's article, which precedes this one, the linear orderings which he formed are based upon the relative degrees of similarity among a group of collections from an archaeological site. The types or criteria used by Robinson in computing the measures of agreement were chosen by Brainerd from his field tabulations. The sum of these criteria normally constituted a high percentage of each collection but never the total collection.

The criteria of constant combination of attributes in the defining of types and of complexity of attributes in gauging their cultural validity had been adhered to in the making of the field tabulations. From types meeting these requirements were selected those suspected of showing significant variations in frequency among the samples. The criteria chosen belonged to various grades in a hierarchic classification; some were wares, some vessel forms, some rim shapes, since the classification had originally been made in that form. The base used for frequency computation was the sum of the criteria chosen, not the collection total.

It should be emphasized that the collections worked on by Robinson were not chosen as likely prospects but were, on the contrary, those which had failed to yield chronological sequences to Brainerd's inspectional techniques. Robinson's results are thus free of any bias from hypotheses previously formed by Brainerd on other than statistical grounds. This is not a mathematical expression of a previously hypothesized ordering[9] but a *de novo* objectively determined sequence.

To determine whether or not chronology was the causative factor in the formation of his collection orderings Robinson repeated his technique on the Mani collections which showed stratigraphic ordering, and has demonstrated that the distribution of individual types in the orderings obtained by his technique are those previously known as correct (Fig. 91). That his results checked accurately shows that his method will order collections correctly at least in certain cases when chronologic differences are present, but does not conclusively rule out the possibility of factors other than chronology causing a sequence in all instances. Certain irregularities of type frequencies in the Maya ceramic collections suggest quite definitely that factors other than chronology and sampling errors must be hypothesized to account for variation in single sites. In an effort to provide theoretical bases for the more accurate isolation and analysis of chronologic variation and thus to permit analysis of the remaining non-chronologic variation, the following series of tests was run:

The classification categories of the sites were graphed in Robinson's seriated order of collections. These graphs show the characteristic lenticular shapes previously established as characteristic in chronologic sequence. Included in these graphs are various categories

methods (Kroeber, 1940). Similarities between this and Robinson's work are doubtless due to the fact that both techniques were formulated to demonstrate relationships based on mathematical measures of similarity. No former work on this basis has been oriented toward chronology; clumping, not seriation of collections in matrices, was attained by previous studies. Also, qualitative rather than quantitative trait distributions have generally been used by previous workers to compute measures of similarity.

[9] Cf. discussion by Griffin (1943, p. 334) on the procedure of workers under the Midwest Taxonomic System.

not included in Robinson's computations. Figure 92 shows an abbreviated series of graphs of the Kabah pottery according to Robinson's ordering.

That these characteristic nodal curves are followed by several wares, types and shapes concurrently suggests that the causative factor must have been linear in nature, and that it is correctly represented by the linear ordering furnished by Robinson. Although it might be possible that varying frequencies of a single well-represented type, coupled with the inevitable and complementary frequency changes in all others, might yield an ordering by Robinson's technique, these graphs show concurrent changes in groups when computed on separate percentage bases, and thus their variations are not simply complementary to each other. An additional check on the possibility of the ordering being due to variation in a single type was made by Robinson. Measures of agreement were recomputed for a site after eliminating the type showing the largest percentage variations in the series. The ordering was not changed thereby.

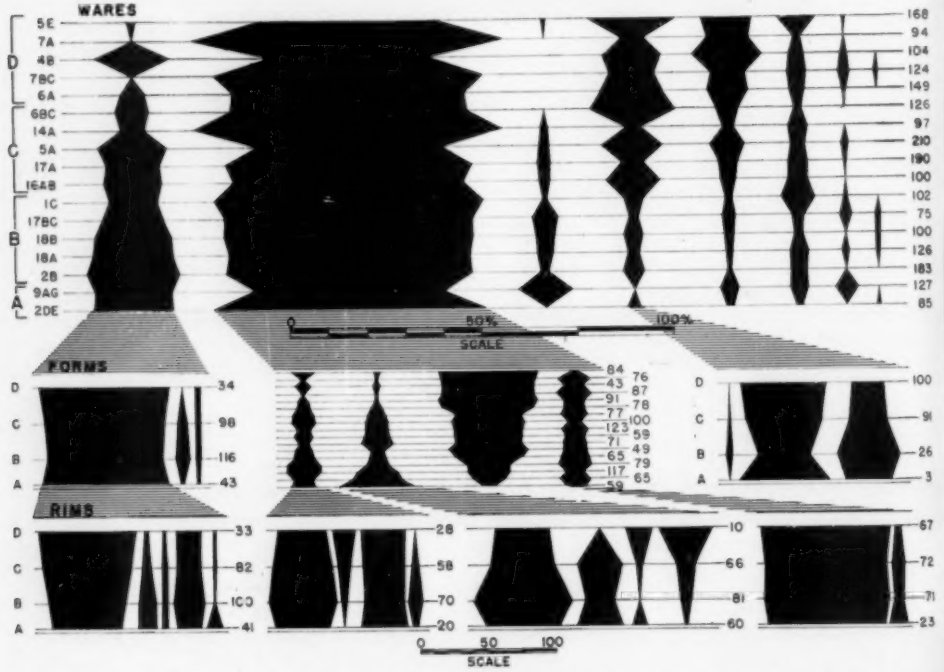

FIG. 92. Ceramic frequencies in the Kabah ordering. The collections, which came from trenches dug within the site of Kabah, are in the order determined by Robinson's mathematical technique; late collections are toward the top, early toward the bottom. The upper percentage scale applies only to the upper graph, the lower scale was used to plot the two lower rows of graphs. Numbers of fragments in the groups considered are given to the right of each graph and should be used to judge the validity of frequencies in their groups. The upper graph shows frequencies of rim sherds of the 8 major wares found. Unslipped ware, first column, decreases through time. Thin Slateware and Thin Redware, columns 4 and 5 respectively, increase through time. The second row of graphs shows frequencies of vessel forms of certain of the wares, each computed with its ware total as 100 percent. When ware totals have been too small to provide statistically useful samples the collections have been grouped as shown into four sequent clusters, A, B, C and D. Note in the center graph, which shows Medium Slateware divided into jars, basins, basal break bowls, and hemispheroid bowls, that the jars and basins decrease in frequency through time, while the basal break bowls increase. The lowest row of graphs shows the frequencies of the commoner rim shapes of certain of the vessel forms shown in the middle row of graphs.

It is believed that the above mentioned linearity of causal factor may with certain reservations be used to isolate chronologically caused variation from variations produced by other causes. Factors such as regional differences in culture and social stratification suggest themselves as the likely causes of variation alternative to chronology. The regional variations in culture studied by Driver and Kroeber by techniques quite similar to those evolved by Robinson gave matrices which, as would be expected, show clumping rather than linear ordering. Regional cultural variation can confidently be expected to show other than a linear matrix patterning since the geographic framework in which it evolved is of itself multidimensional.

The question of variation in pottery deposits due to social stratification in the site is a knottier one. In general a linear sequence running coarse to fine pottery and based on wealth or social power might be conceived to occur in sites of complex societies, complicated by such variables as industries with special uses for ceramics and in Maya sites very possibly by special ceramics used in religious ceremonies. The graph shown for Kabah (Fig. 92) may be inspected to decide whether chronology or social stratigraphy has caused our sequencing. It will be noticed that unslipped ware and Medium Slateware jars and basins decrease bottom to top while Thin Slateware, Thin Redware and Medium Slateware basal break bowls increase. This sequence in general shows coarser wares and larger vessels at bottom with finer smaller pottery at the top, suggesting a possible basis of cultural stratigraphy for the seriation. Some of the changes through the ordering are not, however, thus classifiable. It is difficult to imagine why simultaneous frequency changes should occur in so many seemingly unrelated shapes and forms unless a chronological factor were dominating the sequence. Fortunately, inspection of collections dating before and after the occupation of Kabah bears out a chronological trend through time toward finer pottery; a factor other than chronology is not needed to explain it.

ANALYSIS OF ORDERED MATRICES

From the above analysis and similar analyses done on other sites it seems safe to assume that the linear orderings shown in Robinson's matrices are the result of chronology, and that strong deviations from a linear ordering are likely to have been caused by factors other than chronology. To aid in the judgment and interpretation of matrices I have found it advantageous to contour them in the manner of relief maps and to construct a series of matrices from geometric models to discover the significance of their "surface characteristics." Figures 95, 96, 97, 98 and 99 are matrices contoured in this manner.

If contoured, Robinson's mathematical model (Table 16) would show a central ridge of high measures of agreement with sides of constant slope diagonal to the upper right-hand and lower left-hand corners. These two slopes are mirror images of each other about the diagonal of perfect agreement. The table may be said to be analogous to results from a series of short term, unmixed collections showing a constant rate of ceramic change between each successive two. The collections may be visualized as successive points on a straight line, equidistant at one unit of measure apart. Measures of agreement between any two may then be obtained by measuring distance and subtracting it from a constant, in this case 7. For example, from point 2 to point 6 measures 4 units. By subtracting these 4 units from the 7 above we derive 3 — the figure in Robinson's table.

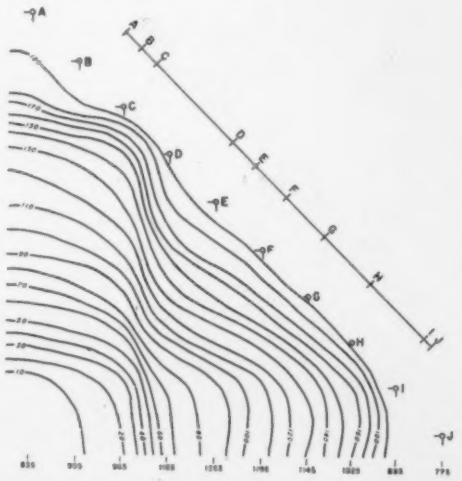

FIG. 93. Geometric model of points irregularly spaced along a straight line. Line is 200 units in length. Distances between points have all been subtracted from 200, and resultant values contoured.

Using the same geometric system we can compute and contour a matrix from a group of points irregularly spaced along a straight line 200 units in length (Fig. 93). In this and the following matrices presented, we show only the lower left half; the other half is always mirror symmetric across the diagonal axis. This matrix should be to some degree analogous to that given by collections separated by varying degrees of chronologic (linear) change or, more properly, by relative degree of ceramic change since such change is our only measure of time lapse. Note that the contours all equally change direction along lines parallel to the axes of the matrix both horizontally and vertically between points C and D, the two most widely separated adjacent points of the sequence. Also note that the sums of the matrix columns, shown along the baseline, depart markedly from the smooth curve of those in Robinson's Table 16, the sums of close spaced points grouping closely, those of widely spaced points showing larger differences. This synthetic matrix shows markedly similar characteristics, both in contour and column sums to the Mani matrix, in Figure 99. The collections from this site, which occurred stratigraphically, show marked ceramic change among the major pottery wares at the points indicated: between 2G and 4F, between 4C and 4D and between 4A and 1A. The ceramic collections at Mani would be expected to show these sharp changes since deposits some 2.5 meters deep document over 2,000 years of ceramic change, as compared to from 150 to 400 years in the other matrices illustrated.

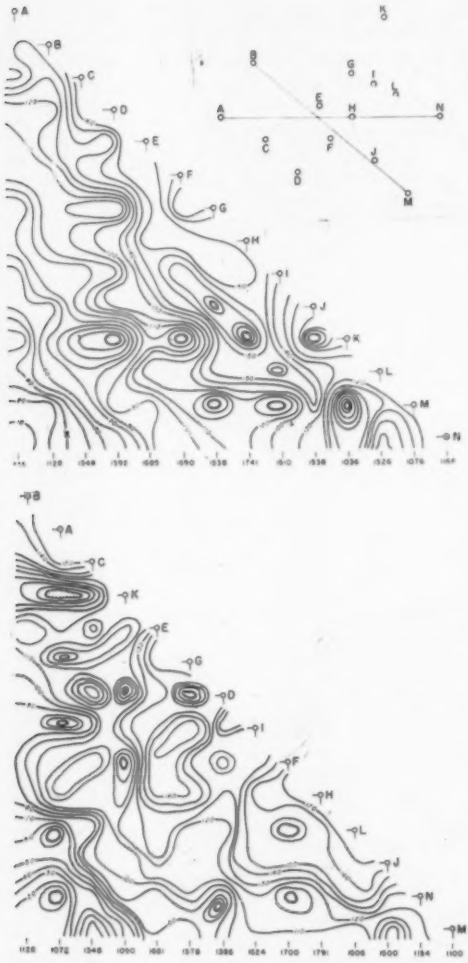

FIG. 94. Geometric model of points spaced at random in a plane. A-N is 200 units in length. Matrices have been formed about two lines A-N and B-M. Distances between points have all been subtracted from 200, and resultant values contoured.

Another synthetic matrix was plotted using a group of points having a random pattern in a plane. Linear arrangements in two directions were tried, oriented to align with widely separated points (Fig. 94). These matrices should give some idea of the irregularity of contour to be expected if the best possible linear arrangement be made of a group of collections showing no close relationship to a linear (chronologic) pattern. All matrices from the Yucatan pottery are more regular than either of these with the exception of Uxmal thus indicating that Robinson's results are in most cases not merely artifacts of his technique as applied to nonlinear material. Graphing of the pottery types in the Uxmal collections in seriated order showed that even with this unprepossessing matrix (Fig. 96), the ceramic change of the major wares corresponds in general to those of other contemporaneous sites. The irregularity of contour seems due to "wild" values of the fine wares, a suggestion of the strong intrusion of social stratigraphy into the total variation.

Fundamental to the working methods used in this study is the assumption that each collection consists of artifacts made during a

shorter time span than that covered by the whole group of collections. The formation of chronological orderings verifies this assumption but does not sort from the data the results due to variable time span of deposit of artifacts included in a single collection. The results of the latter causative factor are obviously to be suspected of bulking large when the collections come from a concentrated area or site, when deposits are shallow, when the total time period is short, and when the analysis is carried to the ultimate degree of chronologic subdivision. All these factors apply to our material.[10]

The accurate determination of these chronologic variabilities in individual collections is of course possible only in the terms of relative amount of ceramic variability in collections, since this variability is our only time indicator. In the analysis of collections for span of deposition of individual collections some separation between the causative factors may be possible: (a) the time during which the archaeological deposit was laid down in its final position before excavation, and (b) amount of admixture of earlier material through reuse of earth, and (c) that of later material introduced by animal and plant activities since deposition. The effects of factor (a) may be assumed in the main to be a mixture of artifacts more or less evenly covering a segment of the time span of the site. Factor (b) is more likely to cause a mixture of material from two markedly separated intervals of that segment of the time span preceding deposition, and factor (c) is likely to cause sporadic occurrence of small numbers of artifacts of later date in preponderantly earlier collections. Factor (c) is nearly certain to be the least active of these three in a long occupied site.

The effects of these factors on a linearly ordered matrix can be to some degree prophesied. In Robinson's synthetic model (Table 16) the measures of agreement of each collection rise steadily from a low value at each edge of the matrix to a high at each side of the diagonal. His model is analogous to a condition where each collection represents but a point on the time scale. If, on the other hand, the deposition of a single collection covers in an even manner the whole time span of the matrix, the inverted V figure formed by profiling its measurements of agreement with the other collections in sequence will be lower at the vertex and higher at the ends than are those of the short span deposits.

FIG. 95. Contoured matrix of the final ordering of Kabah.

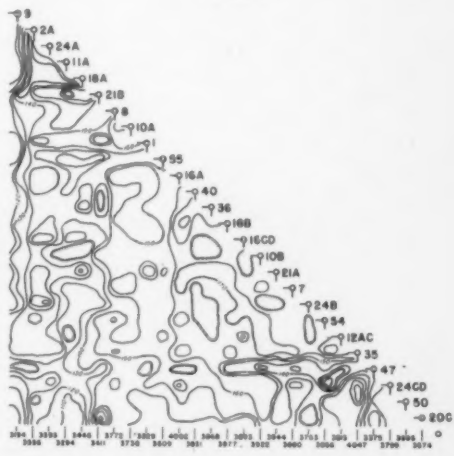

FIG. 96. Contoured matrix of the final ordering of Uxmal.

[10] In most analyses of sherd materials from sites this problem is met by taking only the "pure" collections, that is, those collections showing most striking differences among them, to define chronologic phases, components, or horizons. The bulk of the material is then assumed to be "mixed" or "transitional" and its characteristics are used only to augment the detail of the descriptions taken from the "pure" collections.

This diagnostic feature of long term collections has been checked empirically by inserting into sequences synthetic collections formed by combining several collections in the sequence and computing new frequencies. A synthetic long term collection when sequenced will fall into a position intermediate among that of its component collections, and will show lower measures of agreement with adjacent collections in the sequence, and higher measures with distant collections than will shorter term collections. Relative "degradation of profile" is thus a measure of the time interval covered by the materials contained in the deposit, and a mathematical measurement of relative time spans of the collections in a matrix may eventually be feasible. The column total of measures of agreement in the instances tried fitted well into the even, non-disjunctive sequence of column totals as exemplified by Table 16. Thus column total variability seems promising as a criterion in separating effects of mixed collections and variable period of depositions from those of variable spacing in ceramic change. Meanwhile much may be seen by inspection of contoured matrices.

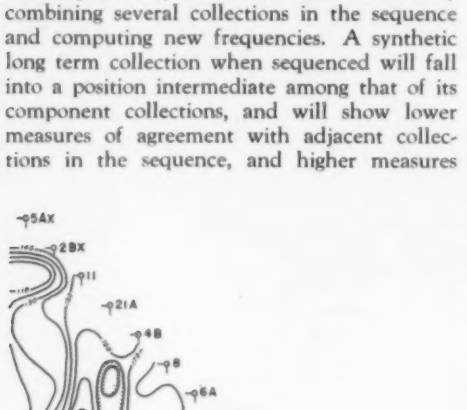

FIG. 97. Contoured matrix of the final ordering of Sayil.

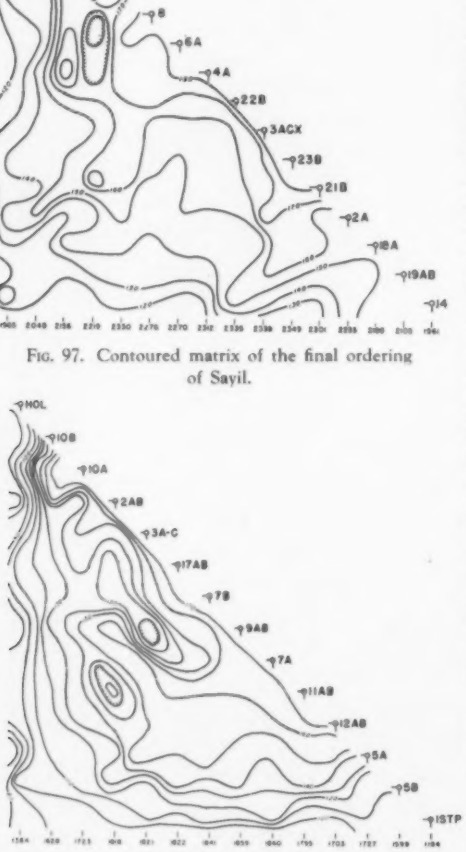

FIG. 98. Contoured matrix of the final ordering of Holactun.

Many profiles show multiple peaks. Multiple peaks in a degraded profile indicate the presence of materials which fit the sequence at the points indicated by the peaks. Thus a single profile may be checked for high points and the position in the matrix where such points fall will indicate the time level from which the mixed or long term deposit has received material. The actual analysis of this condition is complicated by the fact that all collections in the matrix are sure to cover varying time intervals, and each measure of agreement is a function of two collections. In analyzing which of the two component collections has caused a given peak the column and row profiles should allow a judgment. Whichever profile shows a documented upslope adjoining the peak is the one to suspect as a mixed collection. An isolated high value in a profile suggests that its complementary collection at that point has caused it. In topographic terms spurs from the central ridge or independent ridges suggest that the collections whose profiles they follow are long term. In the making of any of the above analyses the column totals of measures of agreement should first be checked to assure that irregularity of spacing along the axis of ceramic change is not the causal factor.

It should be easy for the reader to gather from the above that the interpretation of the apparently chaotic topography of Robinson's matrices has not yet reached the ordered stage of an exact technique. It may be worthwhile for Brainerd to record, however, his conviction that the fault lies in the immaturity of his working methods rather than in any permanent intractability of the data. There is considerable

evidence that the results of variable deposition span and of variable spacing of collections along the axis of ceramic change (the time axis) can be objectively, and quite precisely, separated. The proper understanding of these two variables and the consequent control of the errors introduced by them into the time scale should improve the precision of time placement of collections, and concurrently allow a closer separation of variability due to time from that due to such causes as social stratification and regional variation and trade.

Early in the course of this project it was noticed that in contoured matrices from several Puuc sites there is a tendency for the matrix to slope upward toward one end of the diagonal axis rather than parallel to the axis as would be expected, and that concurrently the other end of the axis shows a very sudden rise to high value from low values at edge of matrix (Figs. 95, 96, 97, 98). Graphing of the pottery sequences covered by the collections which formed these matrices, and comparison with stratified material, showed that the four examples were uniform in that the sharply rising end of the ridge is the early end of the sequence. Reading along the profiles of the individual collections reveals that those at the early end of the sequence show the characteristics outlined above as those of short term deposits, a high peak value for adjacent collections, low values for those further removed in the sequence. Collections at the late end of the sequence conversely show the degraded profiles of long term deposits. Although this tendency is not striking it was sufficient to allow recognition of time direction before its causes were known.

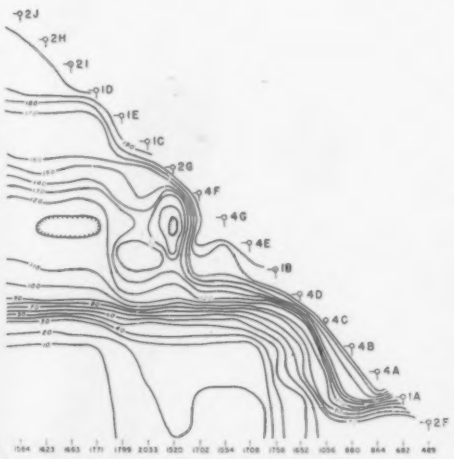

FIG. 99. Contoured matrix of the final ordering of Mani.

The cause must be progressive mixing of deposits, the factor (b) of page 309 acting with increasing strength through the depositional period of the site. This principle has been recently used by Kidder to hypothesize the priority of a phase from mixed deposits (Kidder, Jennings and Shook, 1946, p. 258). This phenomenon may be expected to show most strongly in groups of collections from a concentrated site showing continued occupation. Its value in giving time direction in sites where stratigraphy has not been obtained should be obvious.

SUMMARY OF RESULTS

The results which Brainerd believes have been gained during the work of which this is a progress report may be summarized.

First, and of major importance, Dr. Robinson has worked out a mathematically simple, objective technique for the chronological seriation of archaeological collections. This technique requires no special system of classification and recording and thus is immediately applicable to large masses of tabulated material which, if not found stratigraphically, are often difficult to place by present techniques, and it allows their more accurate assignment in a chronological scale. Such assignment greatly increases the efficiency of archaeological analysis, and there is sound reason for desiring this; archaeological deposits are not inexhaustible. I believe that undoubtedly seriations formed by this technique will allow refinements in chronology greater than those currently possible, but it should be cautioned that the number of seriated steps is no direct measure of the number of chronological substages which may reliably be defined, since spans of deposition of individual deposits are very likely to overlap considerably with those of adjacent collections. It should also be cautioned that, as has so often been said of statistical techniques, this method will not give closer results than are inherent in the data put into it; although poor typology should not give erroneous orderings, it cannot be expected to give finely graded seriations. An additional caution should be given

as to the type of material suitable for this technique. Since the seriation of collections depends upon relative degrees of difference between collections, orderings cannot be obtained from collections which do not share a number of their included types. Stratigraphy is the only valid method for the sequencing of completely disparate cultural materials, and, save in deposits where progressive mixing has occurred, it is the only device for obtaining time direction. Although stratigraphy has often been called the final proof of archaeological sequence, it seems questionable whether possible errors due to redeposition do not render stratigraphy at times less reliable than are the internal evidences of concurrent culture changes upon which seriations depend. Stratigraphic placement supported by the evidence of finely graded concurrent cultural changes through the artifacts from a series of overlying deposits is certainly a final clincher; it is unfortunate that such deposits are found so seldom!

Robinson's statistical technique for chronological ordering is a tool ready for use. Although its results will need constant testing and evaluation, its underlying *rationale* is uncomplicated enough to allow most archaeologists an adequate judgment as to the meaning of its results. Techniques for the utilization of the numerical data produced by the procedure are the present need and these must be evolved by archaeologists. Beginnings in the recognition of the relative spacing of collections along the chronological axis and of the relative spans of deposition of individual collections are described in this paper. These techniques when developed fully should allow a more precise separation of time-caused variation in archaeological collections. A promising clue to the determination of early from late end of sequences found from non-stratified collections has also been described. Adequate understanding and analysis of the variation caused by time in archaeological collections allows the close documentation of culture dynamics, and throws into sharper relief the non-chronologic variation from which the archaeologist can in turn make more finely drawn and reliable inferences as to the functional relationships shown by his material.

BIBLIOGRAPHY

Beals, Ralph L., George W. Brainerd and Watson Smith

1945. "Archaeological Studies in Northeast Arizona." *University of California Publications in American Archaeology and Ethnology*, Vol. 44, No. 1. Berkeley.

Brainerd, George W.

1948. Review: The Ancient Maya (Sylvanus Griswold Morley). *American Antiquity*, Vol. 14, No. 2, pp. 133-6. Menasha.

Brew, John Otis

1946. "The Archaeology of Alkali Ridge, Southeastern Utah." *Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, Vol. 21. Cambridge.

Driver, H. E. and A. L. Kroeber

1932. "Quantitative Expression of Cultural Relationships." *University of California Publications in American Archaeology and Ethnology*, Vol. 31, pp. 211-56. Berkeley.

Ford, James A.

1938. "A Chronological Method Applicable to the Southeast." *American Antiquity*, Vol. 3, No. 3, pp. 260-4. Menasha.

Ford, James A. and Gordon R. Willey

1949. "Surface Survey of the Viru Valley, Peru." *Anthropological Papers of the American Museum of Natural History*, Vol. 43, Pt. 1. New York.

Griffin, James B.

1943. *The Fort Ancient Aspect*. University of Michigan Press. Ann Arbor.

Kidder, A. V.

1915. "Pottery of the Pajarito Plateau and of Some Adjacent Regions in New Mexico." *Memoirs, American Anthropological Association*, Vol. 2, Pt. 6, pp. 407-62. Menasha.

Kidder, A. V. and Anna O. Shepard

1936. *The Pottery of Pecos*. Vol. 2. Yale University Press. New Haven.

Kidder, A. V., Jesse D. Jennings and Edwin M. Shook

1946. "Excavations at Kaminaljuyu, Guatemala." *Carnegie Institution of Washington, Publication* 561. Washington.

Kluckhohn, Clyde

1939. "On Certain Recent Applications of Association Coefficients to Ethnological Data." *American Anthropologist*, Vol. 41, No. 3, pp. 345-77. Menasha.

KRIEGER, ALEX D.
1944. "The Typological Concept." *American Antiquity*, Vol. 9, No. 3, pp. 271-88. Menasha.

KROEBER, A. L.
1916. "Zuni Potsherds." *Anthropological Papers of the American Museum of Natural History*, Vol. 18, Pt. 1. New York.
1930. "Cultural Relations Between North and South America." *Proceedings of the 23rd International Congress of Americanists*, pp. 5-22. New York.
1940. "Statistical Classification." *American Antiquity*, Vol. 6, No. 1, pp. 29-44. Menasha.

NELSON, N. C.
1916. "Chronology of the Tano Ruins, New Mexico." *American Anthropologist*, n.s., Vol. 18, No. 2, pp. 159-80. Menasha.

OLSON, RONALD L.
1930. "Chumash Prehistory." *University of California Publications in American Archaeology and Ethnology*, Vol. 28, No. 1. Berkeley.

ROUSE, IRVING
1939. "Prehistory in Haiti, A Study in Method." *Yale University Publications in Anthropology*, No. 21. New Haven.

SPIER, LESLIE
1917. "An Outline for a Chronology of Zuni Ruins." *Anthropological Papers of the American Museum of Natural History*, Vol. 18, Pt. 3. New York.

STEWARD, JULIAN AND FRANK M. SETZLER
1938. "Function and Configuration in Archaeology." *American Antiquity*, Vol. 4, No. 1, pp. 4-10. Menasha.

TAYLOR, WALTER W.
1948. "A Study of Archaeology." *Memoirs, American Anthropological Association*, No. 69. Menasha.

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STARVED ROCK ARCHAIC, A PREPOTTERY HORIZON FROM NORTHERN ILLINOIS

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INTRODUCTION

DURING the summer seasons of 1947, 1948, and 1949 the University of Chicago and the Illinois State Museum co-sponsored archaeological excavations in LaSalle county, northern Illinois.[1] In 1947 the site on top of Starved Rock (known as LS 12) was sampled by means of several test pits. In 1948 intensive excavation was carried out at LS 12. In 1949 LS 12 was again intensively excavated by a small crew of students under the writer's direction. As of January, 1950 approximately one-quarter of the total surface of the Rock has been excavated, including excavation carried out in 1949 by Richard S. Hagen for the state of Illinois.

Near the end of the 1948 season a non-pottery manifestation was recognized and distinguished from the other cultural remains. The 1948 materials plus pertinent data from the 1947 tests have been described and analyzed by the writer (Mayer-Oakes, n.d.). Announcement of this manifestation was made in April, 1949; a more detailed summary has been published (Mayer-Oakes, 1949a, 1949b). A final report of all recent University of Chicago work in the Starved Rock area is in preparation. It will present the raw data upon which the present specialized, descriptive summary is based.

In general the 1949 excavations corroborated the information obtained in previous seasons. The complex of chert, stone and copper artifacts which underlies pottery-bearing levels is the lowest cultural stratum found on Starved Rock. The most obvious diagnostic item of the non-pottery complex is the truncated lanceolate (leaf-shaped) projectile point with concave base and flaking characterized by a variety of the "ribbon" or parallel technique. Chief reasons for assigning this unit to a prepottery or Archaic horizon are (1) its stratigraphic

[1] For assistance in the field and in the preparation of this summary report the writer is indebted to Kenneth G. Orr, the field director, Thorne Deuel, Gordon Keller and the graduate students who were the excavators. My wife, Nita Allison Mayer-Oakes was especially helpful both as excavator and as laboratory assistant. Richard S. Hagen kindly permitted the writer to examine the artifacts excavated at Starved Rock in 1949 for the Illinois State Architect's Office. James B. Griffin is due thanks for helpful criticism.

position (underlying pottery levels which contain sherds representing Early, Middle, and Late Woodland, Middle and Upper Mississippi), (2) the absence of pottery, and (3) the type of projectile point similar to those found in early lithic horizons on the Plains.

THE SITE

Starved Rock is an isolated bluff of St. Peter sandstone which rises perpendicularly from the bank of the Illinois River opposite the village of Utica, Illinois. The nearest large town is LaSalle. Accessible only from the south side, the Rock rises 125 feet above the river to a roughly circular, flat top 120 feet in diameter. The top of the bedrock is probably basin-shaped since the soil deposit is about six feet deep at the center, while the sandstone crops out along the edges.

The Rock has evidently existed in its present form since the close of the Pleistocene. It probably was isolated from the surrounding uplands by stream action resulting from the melting of the last glacier (Willman and Payne, 1942). Commanding an excellent view of the broad valley, adjacent to an ample supply of water and a means of transportation, the Rock was often utilized as a habitation site from earliest to latest times. The early French explorers recognized the advantages of the site and built there a structure which has been identified as Fort St. Louis.[2] At present the Rock is the central tourist attraction of the Starved Rock State Park which encompasses most of the local area of canyon and bluff development.

STRATIGRAPHY

Starved Rock was evidently inhabited by the earliest men in northern Illinois and subsequently by several other Indian groups until historic times. This is indicated by the diversity of materials found. Occupations, as defined by features or habitation levels, are as follows:

European manifestation	(Fort Saint Louis)
Fort Ancient aspect	(LaSalle component)
Oneota aspect	(Fisher manifestation)
Healy aspect	(Late Woodland-Mississippi mixture)
Tampico phase	
Starved Rock Archaic	

In addition, potsherds typical of the Early Woodland phase, the Hopewell phase, the Middle Mississippi phase, the Late Woodland phase and the Natchezan culture (Fatherland Incised) have been found scattered throughout the pottery-bearing levels.[3] These probably represent either occupations not yet uncovered or trade pieces. While the Archaic unit underlies all other cultural units, the relative stratigraphic positions of all the other units have not yet been determined.

The natural stratigraphy on the Rock is fairly simple. Approximately twelve inches of black humus overlies a two-foot layer of brown loam at the base of which is a mottled yellow brown zone, three to five inches thick. This mottled layer overlies a sterile yellow sandy-clay layer which merges with the bedrock about five feet below ground surface. In undisturbed areas the cultural materials are found only in the upper three and one-half feet of soil.

The non-pottery manifestation described in this paper is the lowest cultural stratum; it rests on sterile subsoil as a layer twelve to eighteen inches thick. Only the uppermost two feet of soil, and features originating therein, contain the ceramic materials.

This undisturbed condition is more of an ideal, than a real situation. Most of the excavated areas showed a stratigraphy complicated by many intrusions from the later horizons into the earlier ones due to the digging activities of the later occupants. In several areas, however, it is possible to see the undisturbed stratigraphy, and it is clearly as stated above.

In six of the five-foot squares containing Archaic materials, thick grit-tempered, cord-marked, flat-based pottery resembling Fayette Thick of Kentucky Adena, immediately overlies the non-pottery materials. This suggests an early Woodland occupation following the Archaic. Because of a relative paucity of materials from the 18"- 24" level there is also a suggestion of a period of infrequent habitation immediately following the Archaic occupation.

[2] Identification was done by tradition, ethnohistorical research mss. in University of Chicago files, and by excavation by the University of Chicago.

[3] These data from unpublished information in files of the University of Chicago Department of Anthropology and personal observations. See also Orr (1949).

EXCAVATION DATA

Techniques employed in excavation were those commonly used in midden digging. The excavated areas were sections of a grid, the units being five-foot squares which were taken down in six-inch levels. Features were difficult if not impossible to determine above the 24" level. When discovered, they were excavated by levels, separately from the rest of the square.

The non-pottery unit was recognized during the latter part of the 1948 field season. The 1949 excavations, however, were directed toward unearthing more of this unit on the basis of its preliminary definition. During 1949 an area 20'x 30' was excavated to subsoil or bedrock. All soil was put through a ¼" screen. The levels below 18" were difficult digging, but exact locations of potsherds and typical archaic artifacts resulted from the painstakingly slow excavation. Approximately two-thirds of the total area was clearly undisturbed in the lower levels. The non-pottery materials from these undisturbed areas are the basic data summarized and described in this paper.

CULTURAL COMPLEX

The materials included in this analysis represent a selection of the artifacts found in the levels below 18". The selection standard was rigid; no materials were included which did not come from a clearly undisturbed non-pottery area. There are several instances of what is probably a chance association of Archaic artifacts with pottery, which have been excluded for the sake of the stronger evidence.

The artifacts represent four main categories of material: chert, stone, metal and bone. The bulk of the artifacts consists of chert projectile points and scrapers. The descriptive terms used are common ones with the possible exception of "whetstone." W. S. Webb (1949) has suggested that these items may be bar atlatl weights.

The copper items are perhaps unique. The projectile point of cold-hammered native copper (Fig. 101, 30) represents an archetype of the major chert form.[4] The two ornaments are problematical. One is a small button-like disc; the other is a hollow, truncated wedge. The fourth item is a solid chunk of copper.

[4] The writer is indebted to R. K. Wyant of the Chicago Natural History Museum for his analysis of the copper.

Only two structural features can be assigned to this horizon. One is a small pile of unworked stones (no evidence of fire), the other a discoloration in the soil which probably represents a shallow pit. No hearths or burials were found associated with this non-pottery unit. The few small fragments of bone found have been identified as drumfish and Virginia deer.

Table 22 is an inventory, by levels, of the Starved Rock Archaic complex as it is known to date. The only pertinent materials not included are those excavated by Hagen from

TABLE 22. INVENTORY, STARVED ROCK ARCHAIC

Projectile Points	18"–24"	24"–30"	30"–36"	36"–42"	TOTAL
Lanceolate	3	13	11	1	28
Side-notched, long	—	1	—	—	1
Side-notched, short	2	4	—	—	6
Stemmed, long	—	—	2	—	2
Stemmed, short	—	—	2	—	2
Stemmed (Beaver-tail)	—	—	1	—	1
Indeterminate fragment	1	5	5	2	13
Scrapers					
End, plano-convex	2	12	14	3	31
Stemmed	—	1	—	—	1
Side	5	17	8	1	31
Bi-facial	1	1	3	—	5
Flake knife	—	3	2	—	5
Side-notched bunt	—	1	—	—	1
Graver	—	2	—	—	2
Drill	2	1	2	1	6
Blade	4	17	9	1	31
Chopper	—	10	12	—	22
Flakes	x	xx	xx	x	—
Mano	—	—	2	—	2
Ground stone fragment	—	7	4	—	11
Ground hematite fragment	—	24	6	—	30
"Gamestone"	—	—	—	1	1
Whetstone	—	4	1	—	5
Sandstone abrader	—	2	—	—	2
Pigment (red ocher)	—	x	x	x	—
Grooved ground stone	—	1	—	—	1
Hammerstone	—	7	4	—	11
Copper lanceolate point	—	—	1	—	1
Copper ornament	—	—	3	—	3
Galena cuboid	—	—	1	—	1
Animal bone	—	10	—	—	10
Worked antler tip	—	1	—	—	1
Clinker	—	—	—	1	1
Features	—	—	—	(2)	—
TOTAL OF ITEMS	20	144	93	11	268

an area covering about one-third the area of the University excavation. I have examined most of the prepottery materials in his collection and find them to indicate a similar inventory. The end scraper and lanceolate point predominate; the large, side-notched, convex-based point is represented. Hagen also found single examples of a side-notched drill and a crude celt, neither of which appears in the larger University of Chicago collection.

Figure 100 is a photograph of the major types of items in the artifact complex. Categories not represented are side-notch point (short), flakes, pigment, animal bone, clinker, indeterminate point fragment, stemmed scraper, and mano.

Because the projectile points comprise one of the two most numerous classes of artifacts and are perhaps the most useful for diagnostic purposes, they have been examined in some detail. Table 23 summarizes some of the relevant descriptive detail. The qualities of form chosen represent observed rather than measured features. This selection of features was made because the categories originated as impressions in the laboratory sorting process. Upon analysis they appear to hold up as valid descriptive units of form.

Since the lanceolate projectile point represents the major type (53%) of all points, it has been treated in most detail. Figure 101 is a photograph of all the projectile points. They are arranged as in Table 23 starting with the top row and reading from left to right. They are also arranged in their stratigraphic position.

The feature of form which is least susceptible to checking from the photograph is the flaking technique. Any item was accepted if it clearly showed a minimum of two adjacent flake scars removed in parallel fashion for a minimum distance of one-half the width of the point. The quality of the flaking technique employed at Starved Rock compares rather unfavorably with the quality of the flaking found on so-called Yuma points. The idea, however, is the same. The concept of removing long series of flakes and doing so in parallel rows was evidently shared by the tool-makers of the Plains and those in northern Illinois. The difference in flaking lies in the technical excellence achieved. From Table 23 it can be seen that the characteristics which correlate most closely are concave base, converging sides, and parallel flaking. These traits are found

TABLE 23. DESCRIPTIVE INVENTORY, PROJECTILE POINTS
(Arranged as in photo, Fig. 101)

	Sides converge to base	Sides diverge to base	Sides are parallel	Concave base	Convex base	Straight base	Parallel flaking	Lenticular x-section	Diamond x-section	Side notches	Stem	
1	....	....	....	....	x	....	....	x	....	x	....	
2	....	....	....	x	....	....	....	x	....	x	....	
3	?	?	?	?	?	?	x	x	....	....	....	
4	x	....	....	....	....	x	x	x	....	....	....	
5	x	....	....	x	....	....	x	x	....	....	....	
6	x	....	....	x	....	....	x	x	....	....	....	
7	x	....	....	x	....	....	x	x	....	....	....	
8	x	....	....	x	....	....	x	x	....	....	....	
9	x	....	....	x	....	....	x	x	....	....	....	
10	?	?	?	?	?	?	....	x	....	?	?	
11	?	?	?	?	?	?	....	x	....	?	?	
12	?	?	?	?	?	?	....	x	....	?	?	
13	x	....	....	x	....	....	x	x	....	....	....	
14	x	....	....	x	....	....	x	x	....	....	....	
15	x	....	....	x	....	....	x	x	....	....	....	
16	x	....	....	x	....	....	x	x	....	....	....	
17	?	?	?	?	?	?	x	x	....	?	?	
18	?	?	?	?	?	?	x	x	....	?	?	
19	x	....	....	x	....	....	x	x	....	....	....	
20	x	....	....	x	....	....	....	x	....	....	....	
21	x	....	....	x	....	....	x	x	....	....	....	
22	x	....	....	x	....	....	x	x	....	....	....	
23	x	....	....	x	....	....	x	x	....	....	....	
24	x	....	....	x	....	....	....	x	....	....	....	
25	....	....	....	....	x	....	x	x	....	....	....	
26	....	....	....	....	....	x	....	x	....	x	....	
27	....	....	....	....	x	....	....	x	....	x	....	
28	....	....	....	....	x	....	....	x	....	x	....	
29	....	....	....	....	x	....	....	....	x	x	....	
30	x	....	....	x	....	....	....	x	(Copper!)			
31	x	....	....	x	....	(Curved flake)						
32	x	....	....	x	....	....	x	x	....	....	....	
33	x	....	....	x	....	....	x	x	....	....	....	
34	x	....	....	x	....	....	x	x	....	....	....	
36	x	....	....	x	....	....	....	x	....	....	....	
37	?	?	?	?	?	?	....	x	....	?	?	
38	?	?	?	?	?	?	....	x	....	?	?	
39	x	....	....	x	....	....	....	x	....	....	....	
40	....	....	....	x	....	....	x	x	....	....	x	
41	....	x	....	x	....	....	x	x	....	....	....	
42	x	....	....	....	....	x	....	x	....	....	....	
43	x	....	....	x	....	....	x	x	(Fluting)			
44	?	?	?	?	?	?	x	x	....	?	?	
45	?	?	?	?	?	?	x	x	....	?	?	
46	....	....	x	....	x	....	....	x	....	....	....	
47	....	....	....	....	....	....	....	x	....	....	x	
48	....	....	....	....	....	....	....	x	....	....	x	
49	....	....	....	....	....	....	....	x	....	....	x	
50	....	....	....	....	....	....	....	x	....	....	x	
51	x	....	....	x	....	....	....	x	....	....	....	
52	?	?	?	?	?	?	x	x	....	?	?	
53	?	?	?	?	?	?	x	x	....	?	?	
	26	1	1	27	6	3	28	50	1	7	5	Total

together on 17 of the 28 lanceolate points or 60% of the cases. I consider this to be the basic mode or projectile point type and call it the *Starved Rock Lanceolate*.

As further indication that these three features are the most important we may note that 19, or 68%, have parallel flaking; 26, or 93%, have converging sides; 25, or 90%, have the concave base. Further correlations show that converging sides and parallel flaking are associated in 18 cases, or 64%; converging sides are associated with a concave base in 24 cases, or 86%; parallel flaking is associated with a concave base in 18 cases, or 64%. No attempt has been made to tabulate the number of cases in which the parallel flaking was oblique. The writer's impression from handling the materials is that the majority of cases were oblique rather than horizontal. In a study of 29 specimens (from both disturbed and good Archaic levels) exhibiting only parallel flaking, 21 definitely showed the oblique pattern.

Of the specimens classified as indeterminate fragments, at least eight probably represent the lanceolate type. This opinion is based on the flaking technique used and a personal feeling from familiarity with the form. The basal section must be present, however, to incontestably determine the point type.

COMPARATIVE SITES

Several prepottery sites are known from the midwest. We will list them, briefly indicating how they may be compared with the prepottery horizon from Starved Rock.

The Faulkner site in southern Illinois has been reported by MacNeish (1948). He feels that it represents a regional variation of the general Archaic pattern of the eastern and southeastern United States. From a comparison of the Faulkner and Starved Rock artifacts the writer feels that the main relationship between the two sites is the stage of culture present—a hunting, gathering, prepottery one. Except for one example which MacNeish calls a true Folsom, the projectile points are not like the Starved Rock lanceolate type. The Starved Rock drill is matched in shape, some of the blade forms are similar and so are some of the scrapers. The pestles may be similar to some of the hammerstones from Starved Rock; red ocher was used by both groups. The Starved Rock projectile points seem to have a very different flaking technique as well as a different form. The kind of chert used is quite distinctive at the two sites. No atlatl weights of the Faulkner type were found at the Rock. The Faulkner people evidently did not use copper or galena.

Maxwell (1947) has reported on prepottery sites from near Carbondale in southwestern Illinois. He finds the artifacts from these campsites to be typologically equal to Indian Knoll and Faulkner artifacts. The main similarity to Starved Rock seems to be the lack of pottery and the implication of an early time period.

A non-pottery unit near St. Louis, Missouri, has been reported by Adams (1949). The materials come from the lowest levels of the Hidden Valley Rock shelter. The similarity to Starved Rock is again mainly that of general time period.

The Dry Run site represents, in central Illinois, the known northern limit of the eastern Archaic pattern. This manifestation

> is a small site located on the point of the bluff overlooking the joining of the two creeks, the Kickapoo and the Dry Run [just west of the Peoria, Illinois city limits]. Its material is limited to stone and chert principally. There are chert knives, scrapers, points, drills and fragments of what might be celts and a gouge (flat on one side, convex on other) . . . the chert runs large as a whole. There is a good proportion of the projectile points that are long, some with concave bases, some stemmed. There are also some notched. . . . The stone items include axes, celts, pitted stones, and stones shaped like a discoidal before it has been hollowed out . . . one that has notches on two opposite sides . . . chert nodules that show use [as hammerstones]. (Schoenbeck, 1949)

This Dry Run material was gathered from the surface of the site over a period dating from about 1938 to the present. What seems to be important about this material is that typologically it ties in with the southern Illinois Archaic, but especially to Adam's Hidden Valley site in Missouri. The presence of the ground stone celt and the gouges is distinctive, but the lack of excavation and pottery makes it difficult to explain these distinctions. The Hidden Valley site and this one are similar in being non-pottery and containing typologically similar chert artifacts. Both do not have the bannerstone which is present in Faulkner and Carbondale. The main specific resemblance to Starved Rock is the few small leaf-shaped points found at the Dry Run site.

There are several relevant sites in Missouri which must be mentioned. A series of sites in Marion and Ralls counties, northeastern Missouri, are reported on by Eichenberger (1944). Some of the sites from which surface materials have been collected are probably pre-pottery. They are located on hilltops and produce chert projectile points which from the illustrations are typologically rather similar to the Starved Rock Lanceolate.

Logan (1949) recently excavated a cave site (Graham cave) in central Missouri which produced evidence for a preceramic horizon. The results of this work will appear in a master's thesis at the University of Missouri. Preliminary analysis indicates that the artifact types have similarities both to the Plains preceramic horizons and the southern Illinois Archaic. The ground stone materials look very much like Faulkner artifacts, but the projectile points do not. Several lanceolate types are present including a minor type which is similar to the Starved Rock Lanceolate in shape and flaking. Fluted lanceolate points, Plainview type points, and large side-notched, concave base points comprise the bulk of this category.

Surface materials from four sites on the western border of Missouri probably indicate a variant of the Plains preceramic horizon. Shippee (1948) has reported this material and he feels that it can be allied with both Signal Butte I and the Plainview site. My examination of these Nebo Hill artifacts has demonstrated to my satisfaction similarities with the Starved

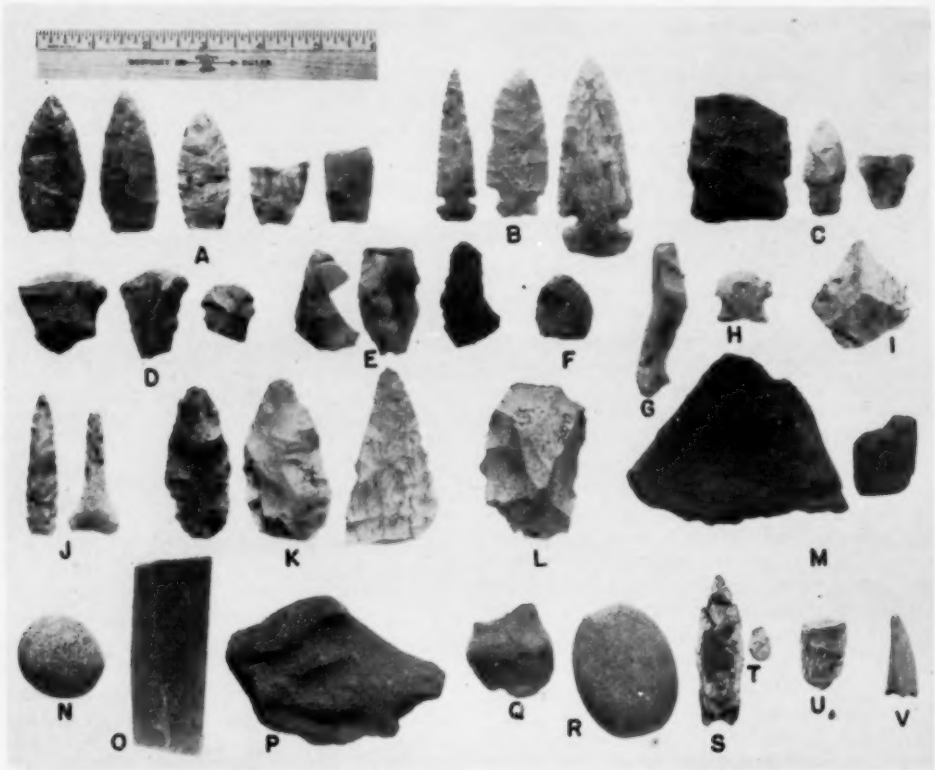

FIG. 100. Artifact complex, Starved Rock Archaic: *a*, lanceolate points; *b*, side-notched points; *c*, stemmed points; *d*, end scrapers; *e*, side scrapers; *f*, bi-facial scraper; *g*, flake knife; *h*, bunt; *i*, graver; *j*, drills; *k*, blades; *l*, chopper; *m*, ground hematite; *n*, "gamestone"; *o*, whetstone; *p*, abrader; *q*, grooved ground stone; *r*, hammerstone; *s*, copper point; *t*, copper disc; *u*, Galena cuboid; *v*, antler tip.

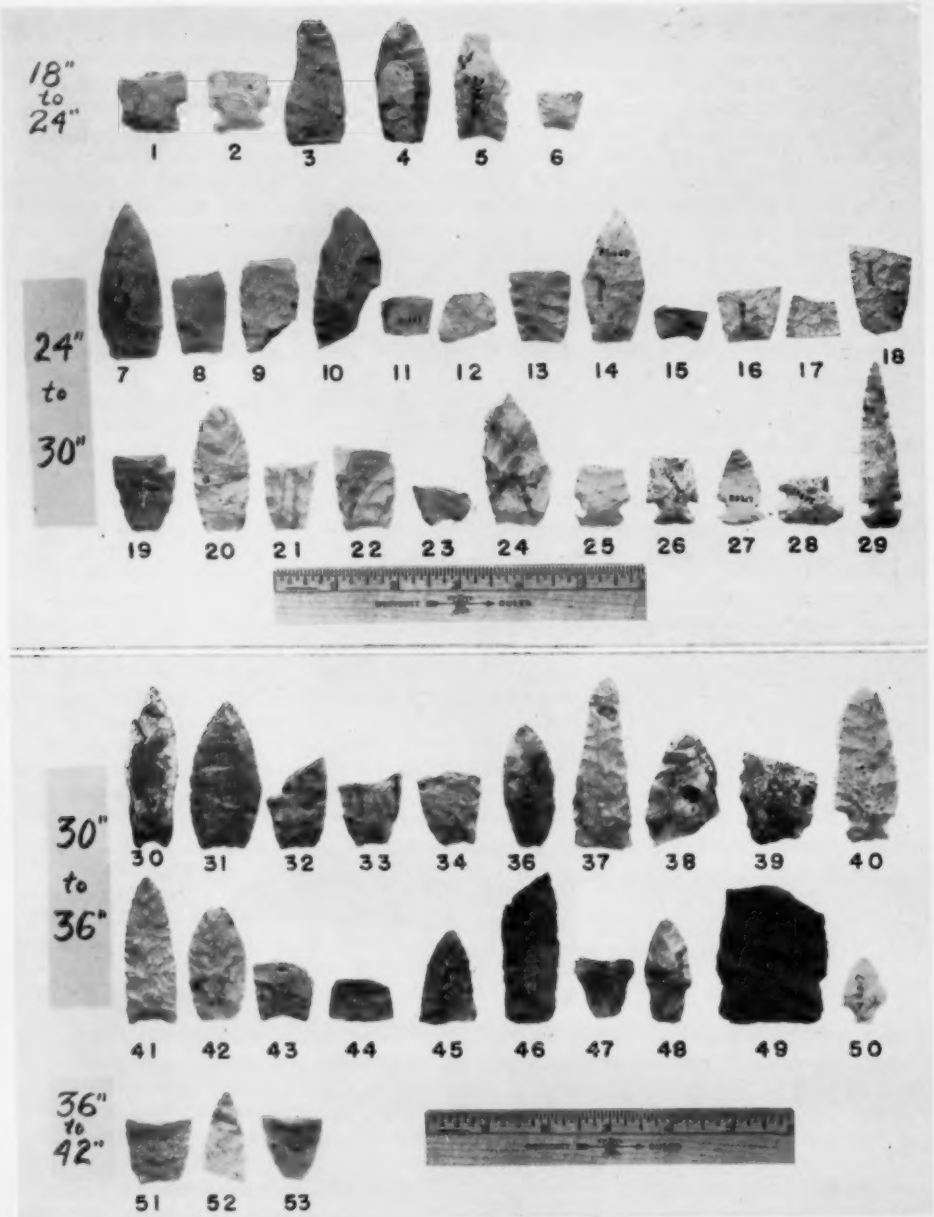

FIG. 101. Projectile points, Starved Rock Archaic.

Rock artifacts. Both sites produce lanceolate-shaped projectile points which show parallel flaking. The Nebo Hill specimens can be distinguished, however, by the predominance of horizontal or irregular flaking, a diamond-shaped cross-section, and a greater length.

The Dalton Culture of central Missouri has been briefly described by Chapman (1948). This lithic complex is a surface collection from one site. The general categories of the complex can be duplicated at Starved Rock. The two main projectile points are lanceolate forms, some of which are like the main Starved Rock type, and a trianguloid point with deeply concave base and serrated edges. Indications are that this is a preceramic complex; Chapman places it in the "Archaic Period" immediately following his Variant Folsom materials.

Northwest of Starved Rock, near Madison, Wisconsin, recent excavations by the University of Wisconsin have uncovered what may be a preceramic unit. In his description of the Airpark Site (Da2), Baerreis (1950) indicates that some nine potsherds were found scattered through a 12"-16" layer of cultural deposit which produced a large quantity of stone artifacts. This may be interpreted as a component to be dated by the Black Sand type of pottery or as a continuum from preceramic into ceramic times. The latter interpretation seems most probable. Thus, some of the stone artifacts ought to be of a time period comparable to the Starved Rock Archaic. The projectile points are both lanceolate (apparently a form quite similar to the Starved Rock Lanceolate) and side-notched. End scrapers and gravers are also present.

A controversial "early" find in Minnesota has been reported by Jenks (1937). This consisted of a fragmentary human skeleton and six chert artifacts. The points found at this Browns Valley site are what Jenks calls Folsom-Yuma in type, that is, they are a truncated lanceolate point characterized by fine parallel flaking. The flaking is better quality than that found at Starved Rock. The Browns Valley points are wider and somewhat longer but are very similar to the Starved Rock type.

The one site which has produced projectile points identical with the Starved Rock Lanceolate is the Angostura Reservoir site, 39FA65, reported by Hughes (1949). The writer has examined the points illustrated by Hughes (1949, Fig. 68, esp. *m*, *n*, *o*, *p*, *q*) and is convinced that except for the differences in type of chert, the points could be interchanged with Starved Rock points. The significance of this identity is not clear since the Angostura materials represent an extremely small sample the context of which is not clearly defined, but probably represents a preceramic horizon.

The Lime Creek sites of southwestern Nebraska have been reported by Schultz and Frankforter (1948) and by Holder and Wike (1949). These sites represent variants of the Plains preceramic horizon; Ft41 is most closely allied with the Scottsbluff materials. Examination of the projectile points indicates that at Ft50 and Ft42 (Schultz and Frankforter, Fig. 12) and at Ft50 (Holder and Wike, Fig. 67, *e*) are found projectile points very similar to the Starved Rock Lanceolate.

Signal Butte I has been described by Strong (1935). This complex from western Nebraska offers close comparisons with the Starved Rock Archaic, both in terms of a general complex of traits and in terms of specific similarities. The projectile point complex of Signal Butte I is quite similar to Starved Rock. At Signal Butte the concave-based lanceolate point "comprises 34 percent of all the other types of projectile points. . . . Less numerous (28 percent of all projectile points) are three types . . . of stemmed points" (Strong, 1935, p. 270-1). At Starved Rock the concave-based lanceolate point is 47% of the total, while the stemmed points are 10% and the notched points are 13%. The major lanceolate type at Signal Butte is very similar to the Starved Rock Lanceolate. In addition to being preceramic, Signal Butte I has been dated geologically as 8,000-10,000 years old. The latest revision of this date is downwards to 6,000-8,000 years ago (Antevs, 1948).

Most of the above comparisons have been made on the basis of general features or, when specific, very limited projectile point similarities. This is justified on the basis of the relative scarcity of data and the assumed diagnostic value of projectile points as a sensitive indicator of cultural change.

The foregoing comparisons have been concerned with preceramic units. There is another complex in central Illinois which has similarities to the Starved Rock Archaic. This is the Red Ocher burial mound complex from Fulton county, described by Cole and Deuel (1937). This complex is doubtfully associated

with a crude, grit-tempered ware presumed to be of Early Woodland time period. The ceremonial complex of copper, galena, and lanceolate cache points as well as other items (notched point, expanded base drill, scratched hematite) is in general very similar to the materials from Starved Rock. But the diagnostic item—the lanceolate point—is not comparable. The general form of the points is very similar, being a truncated lanceolate shape. However, the impression gained from handling both sets of materials is that perhaps they represent different traditions or different time levels (developments) of the same general tradition. The Starved Rock main type is not represented in Red Ocher. This is coupled with an absence of the parallel flaking technique in Red Ocher. In general the Red Ocher points are thinner, wider, have convex sides and straight or convex bases. The possible absence of pottery at Fulton county may indicate a general time period relationship with Starved Rock.

Reporting on a small scale excavation in the northern Ozarks of Missouri, Hoebel (1946) presents evidence for a Red Ocher-like domestic complex. The affiliation with Red Ocher is made primarily on the lack of pottery in the levels which underlie the Central Basin and Tampico horizons. The projectile points are a crude lanceolate type; there is a general suggestion of a succession from a lanceolate form to a stemmed form. The typological relationship with Starved Rock Archaic is quite tenuous.

DISTRIBUTION

The truncated lanceolate point has a fairly wide distribution. Many of the fluted points of the east are of a shape very similar to the main Starved Rock type. Forms which are similar have been recorded (Mayer-Oakes, n.d.) as surface finds from eight counties in the southern tip of Illinois, four counties along the Illinois River between St. Louis and Peoria, two counties in western Illinois, and six counties in northwestern Illinois, in addition to the sites listed in detail above. Projectile points closely similar to the Starved Rock Lanceolate type have been found on the high Plains, one instance being the Powder River in Montana (Bowers, 1949). Mulloy (1943) has found very similar points in Montana cave sites. Hibben (1943) illustrates a point from the Folsom layer at Sandia cave which appears to be the same type as we find at Starved Rock. Roberts (1935) finds points of this general type associated with the Folsom culture at the Lindenmeier site in Colorado. Adams (1940) has made some important statements about this general lanceolate type of point. He thinks it is diagnostic of the Red Ocher phase of Woodland.

TERMINOLOGY

Recent statements by Wormington (1948) and Hughes (1948) indicate the general position which we take regarding the significance of projectile points as diagnostic cultural traits. At Starved Rock we have a predominant major type of point which we term the *Starved Rock Lanceolate*. The type is a definite form found *in situ*, associated with a prepottery complex of artifacts and tied into the local relative chronological sequence. Because of the smallness of the sample and the attenuated state of the feature, an important descriptive feature—the parallel flaking technique—has not been included in the type name. Nor has there been an elaborate subtyping. Points found distributed in other excavated (disturbed) areas of the Rock corroborate the existence of the general lanceolate shape, the specific Starved Rock Lanceolate type, and go a long way toward the demonstration of definite subtypes.

INTERPRETATIONS

The culture, the remains of which have been described in this paper, was evidently a prepottery, semi-nomadic hunting and gathering one. The stratigraphic position and thickness of the non-pottery layer argue for the prepottery designation; no trace of agriculture has been found and no trace of dwellings has been found. The prepottery layer probably represents an accumulation over a long period of years. We would guess it to be at least two-three thousand years. The artifacts considered as a unit in this paper thus represent the remains of the various cultures which inhabited the Rock over this period of years. There is remarkably little change demonstrated by the specimens now available, but continued excavation may alter the situation. There is

the suggestion of a change from stemmed to side-notched points. Both these types, however, are always minor to the lanceolate type.

The Rock was used as a workshop; chert supplies were brought there for use in making tools. It was also probably a lookout and habitation site. Copper was known and used by these Archaic people, the copper projectile point being a unique specimen. It probably represents one of the earliest known examples of metal working by the American Indian—although it is likely that the material was treated as merely another variety of stone which had to be pounded rather than chipped or ground.

Comparisons with other archaeological complexes tend to substantiate giving the Starved Rock materials an early date. Signal Butte I, which is very similar to Starved Rock, has been dated geologically. The dating factors at Starved Rock are primarily those of comparative stratigraphy and typology. Geological study of the soil at Starved Rock is in progress; a preliminary examination of samples from the non-pottery layer indicates that the soil is derived from the bedrock, glacial drift and loess plus organic material.[5]

The hypothesis suggested is that early hunters bearing the Folsom culture moved eastward, and as they did, the characteristic fluted lanceolate point became modified into the eastern type. At some early period in the peopling of the New World, the parallel flaking technique was introduced (it probably represents a technique not likely to be independently invented). This flaking style became associated, in some cases, with the preference for a truncated lanceolate point, and we find the evidence for this culture trait at several sites, notably Angostura, Browns Valley, Lime Creek, and Starved Rock. It is possible that the flaking technique was carried by the Folsom people but did not become popular until a later time period.

[5] The writer is indebted to Leland Horberg of the Department of Geology of the University of Chicago for examination of these soil samples.

The similarities of the Starved Rock Archaic are primarily with materials from the west. Ritchie (1944) has demonstrated a distinctive Archaic complex for the northeastern area. Ford and Willey (1941) and Griffin (1946) both set up general classifications of eastern U. S. cultures which lump southeastern Archaic sites with northeastern ones. Fairbanks (1942) has suggested that there are two distinct traditions represented in the northeastern and southeastern regions. The writer feels that a good case could be made for distinguishing these two sub-areas typologically. And we would add a third area which very decidedly represents a different tradition—the Plains Archaic area. Thus at the general prepottery time level of about 3000 B.C.the eastern part of North America is divided into at least three culture areas: the Northeastern, Southeastern, and Plains.

The Southeastern Archaic pattern comes into southern and central Illinois, but is not yet reported in the north. The Plains Archaic pattern covers the plains states and prairie states and comes into northern Illinois at Starved Rock. Thus we postulate the separation of Illinois into two archaeological culture areas at an early, prepottery time level. The Faulkner, Carbondale, and the Dry Run sites represent the Southeastern Archaic, Starved Rock the Plains Archaic. We have already dated the Starved Rock Archaic as covering a range of time at the end of the prepottery horizon. Based on the dates given for similar sites and the internal indications, we guess this span in years to cover the period from about 3000 B.C. to 500 B.C.

This hypothesis of three archaeological culture areas at the given time level is to be regarded only as a working hypothesis to be critically examined in the light of more complete information. The concept, while perhaps too simple, does seem to organize current knowledge in usable fashion. The significance of the Plains Archaic, as a tradition, is found in the partial closing of the "gap" believed to exist between late Pleistocene complexes such as Folsom and the first ceramic complexes.

BIBLIOGRAPHY

ADAMS, R. MC.

1940. "Diagnostic Flint Points," *American Antiquity*, Vol. 6, No. 1, pp. 72-5. Menasha.

1949. "Archaeological Investigations in Jefferson County, Missouri." *The Missouri Archaeologist*, Vol. 11, Nos. 3 and 4. Columbia.

ANTEVS, E.

1948. Personal communication, Sixth Plains Conference.

BAERREIS, D.

1950. Personal communication.

BOWERS, A.

1949. Personal communication.

CHAPMAN, C.

1948. "A Preliminary Survey of Missouri Archaeology, Part IV, Ancient Cultures and Sequence." *The Missouri Archaeologist*, Vol. 10, No. 4. Columbia.

COLE, F. C. AND T. DEUEL

1937. *Rediscovering Illinois*. Chicago: University of Chicago Press.

EICHENBERGER, J. A.

1944. "Investigations of the Marion-Ralls Archaeological Society in Northeastern Missouri." *Missouri Archaeologist*, Bulletin No. 19. Columbia.

FAIRBANKS, C. H.

1942. "The Taxonomic Position of Stallings Island, Georgia." *American Antiquity*, Vol. 7, No. 3, pp. 223-31. Menasha.

FORD, J. A. AND G. R. WILLEY

1941. "An Interpretation of the Prehistory of the Eastern United States." *American Anthropologist*, Vol. 43, No. 3, Pt. 1, pp. 325-63. Menasha.

GRIFFIN, J. B.

1946. "Cultural Change and Continuity in Eastern United States Archaeology." *Papers of the Robert S. Peabody Foundation for Archaeology*, Vol. III, pp. 37-95. Andover.

HIBBEN, F. C.

1943. "Discoveries in Sandia Cave and Early Horizons in the Southwest." *Proceedings of the American Philosophical Society*, Vol. 86, No. 2, pp. 247-54. Philadelphia.

HOEBEL, E. A.

1946. "The Archaeology of Bone Cave, Miller County, Missouri." *Anthropological Papers of the American Museum of Natural History*, Vol. 40, Pt. 2, pp. 137-57. New York.

HOLDER, P. AND J. WIKE

1949. "The Frontier Culture Complex, a Preliminary Report on a Prehistoric Hunters' Camp in Southwestern Nebraska." *American Antiquity*, Vol. 14, No. 4, pp. 260-5. Menasha.

HUGHES, J. T.

1948. "Naming Projectile Point Types." *Plains Archeological Conference Newsletter*, Vol. 1, No. 5, pp. 4-5. Lincoln.

1949. "Investigations in Western South Dakota and Northeastern Wyoming." *American Antiquity*, Vol. 14, No. 4, pp. 266-77. Menasha.

JENKS, A. E.

1937. "Minnesota's Browns Valley Man and Associated Burial Artifacts." *Memoir, American Anthropological Association*, No. 49. Menasha.

LOGAN, W. D.

1949. Personal communication.

MACNEISH, R. S.

1948. "The Pre-Pottery Faulkner Site of Southern Illinois." *American Antiquity*, Vol. 13, No. 3, pp. 232-42. Menasha.

MAXWELL, M. S.

1947. "The Succession of Woodland Horizons in the Carbondale Area." *Illinois Academy of Science Transactions*, Vol. 40, pp. 30-5. Springfield.

MAYER-OAKES, W. J.

n.d. "An Early Culture at Starved Rock, Illinois." Unpublished M.A. thesis, University of Chicago Library, Microfilm Neg. No. 1856.

1949a. "An Early Horizon in Northern Illinois." *Plains Archeological Conference Newsletter*, Vol. 2, No. 2, p. 12.

1949b. "An Early Culture from Starved Rock, Illinois." *Journal of The Illinois State Archeological Society*, Vol. 7, No. 2. Fairbury.

MULLOY, W. AND O. LEWIS

1943. "Some Early Types of Points From the Lower Yellowstone Country." *American Antiquity*, Vol. 8, pp. 298-9. Menasha.

ORR, K. G.

"Summary Statements of the Present Status of Archeological Research in the Starved Rock Area, LaSalle County, Illinois." Microfilm, University of Chicago Library, June, 1949.

RITCHIE, W. A.

1944. "The Pre-Iroquoian Occupations of New York State." *Rochester Museum Memoir*, No. 1. Rochester.

ROBERTS, F. H. H. JR.
1935. "A Folsom Complex. Preliminary Report on Investigations at the Lindenmeier Site in Northern Colorado." *Smithsonian Miscellaneous Collections*, Vol. 94, No. 4. Washington.

SCHOENBECK, E.
1949. Personal communication.

SCHULTZ, L. B. AND W. D. FRANKFORTER
1948. "Preliminary Report on the Lime Creek Sites: New Evidence of Early Man in Southwestern Nebraska." *Bulletin of the University of Nebraska State Museum*, Vol. 3, No. 4, Pt. 2, pp. 43-62. Lincoln.

SHIPPEE, J. M.
1948. "Nebo Hill, A Lithic Complex in Western Missouri." *American Antiquity*, Vol. 14, No. 1, pp. 29-32. Menasha.

STRONG, W. D.
1935. "An Introduction to Nebraska Archaeology." *Smithsonian Miscellaneous Collections*, Vol. 93, No. 10. Washington.

WEBB, W. S.
1949. Personal communication.

WILLMAN, H. B. AND J. N. PAYNE
1942. "Geology and Mineral Resources of the Marseilles, Ottawa, and Streator Quadrangles." *Bulletin, Illinois State Geological Survey*, No. 66. Urbana.

WORMINGTON, H. M.
1948. "A Proposed Revision of Yuma Point Terminology." *Proceedings of the Colorado Museum of Natural History*, Vol. 18, No. 2. Denver.

Carnegie Museum
Pittsburgh, Pa.
September, 1950

CERAMIC SEQUENCE IN CENTRAL BASIN AND HOPEWELL SITES IN CENTRAL ILLINOIS

ELAINE BLUHM

THE Morton Focus of the Central Basin Phase, or simply Central Basin, is a Woodland assemblage found in central Illinois. There has been a good deal of controversy concerning the relationship of Central Basin and Hopewell since the two were described (Cole and Deuel, 1937, pp. 222-3). Some believed the two were so much alike that perhaps they were the same thing, Central Basin being a poor Hopewellian village group; others believed there was no overlap, but a clean break between them. Most of this controversy was based on ceramic material and the absence of Hopewellian burial mound traits in association with Central Basin pottery. Cole and Deuel (1937, p. 203) said

> Aside from the diagnostic traits, the balance of the artifacts found in Hopewellian sites seem to belong to the Central Basin Phase of the Woodland Pattern. Most of the knives and projectile points are of Type 1 and only differ from Central Basin in being, on the whole, better made.

Three pottery types were described which are found primarily on village sites. Type 2a—a carelessly smoothed, smoothed-over-cord-marked, or cord-marked, grit-tempered type with fine line incised, stroked, punched, or stamped decoration—was said to be diagnostic of Central Basin (Cole and Deuel, 1937, p. 42). Type 2—similar to 2a in paste and temper with punch-marked, bossed, or simple stamped decoration (Cole and Deuel, 1937, p. 40), and 3a—having finer paste than 2a with plain stamp, cord-wrapped-stick, and notched decoration confined to the lip (Cole and Deuel, 1937, p. 47), were the predominate types on Hopewell village sites.

Type 3—a fine polished pottery with collar and channel and cross-hatched rims with hemaconical punctates below (Cole and Deuel, 1937, pp. 42-7), and type 4—smooth surface pottery with curvilinear trailed designs (Cole and Deuel, 1937, pp. 47-8), were present in Hopewell but are associated primarily with the ceremonial complex and found only rarely in the villages.

A study of the illustrations of rim and decorated sherds in Cole and Deuel (1937, pp. 43-7) suggested that type 2a, the Central Basin sherds, had primarily crescent stamp, punctate, and incised decoration. Type 2, the predominate type on Hopewell village sites,

had stamped or rouletted decoration in linear, rocker, or snowshoe pattern, sometimes set off in zones by trailed or incised lines.

A survey of the literature and collections in the University of Chicago anthropology laboratory and the Illinois State Museum revealed that Central Basin and Hopewell sherds had been found together in the same square and level in several sites. Both were found in the Illinois River valley at Fᵛ35 in Fullton county (Cole and Deuel, 1937, pp. 126-31) and the Havana village area in Mason county. They had also been found in association at Ctᵛ1 in Clinton county in the Kaskaskia River valley (Bluhm, 1948). Thus it would seem that Central Basin and Hopewell did overlap in time for the two have been found in association.

In an attempt to clarify the relationship between Central Basin and Hopewell material from undisturbed and well-documented sites had to be utilized. Therefore, a re-examination of the ceramic material in the collections at the University of Chicago from the Fulton county and Tazewell county sites seemed advisable, and the following five sites were selected for analysis:

1—F°54, a burial mound with a village area below it. Some of the village refuse had been used for fill for the mound; however, all the rim and decorated sherds from the mound fill and the village area were Central Basin type, and no Hopewell sherds were found (Cole and Deuel, 1937, pp. 152-61).

2—Fᵛ35, a village or campsite where the refuse deposits were four feet deep. The site was excavated in six-inch levels and over fifty percent of the rim and decorated sherds were of Central Basin type (Cole and Deuel, 1937, pp. 126-31).

3—Fᵛ574, another village where the majority of rim and decorated sherds were Hopewell, a few were Central Basin and a small percentage were later Woodland types (Cole and Deuel, 1937, pp. 166-71).

4—Fᵛ49, a village site, the lower levels of which were Woodland, containing a small percentage of Hopewell sherds, a small percentage of Central Basin sherds, and a larger percentage of later Woodland types (Cole and Deuel, 1937, pp. 161-6).

5—Tᵛ1, a village site with refuse-bearing deposits seven feet thick. There was an increase in the percentage of later Woodland sherds and a small percentage of Tampico sherds in the later levels (Cole and Deuel, 1937, pp. 187-91).

Tᵛ1 was arbitrarily divided into three zones because of the depth of deposit and Fᵛ35 and Fᵛ574 were divided into two zones each.

Body sherds from these sites were examined and found to be similar. They had crushed rock temper, varied in hardness from 2.5 to 4.5, were cord-marked, smoothed-over-cord-marking, or smoothed on the exterior surfaces. These sherds were similar in paste and temper to those decorated sherds classed as Central Basin and Hopewell—types 2, 2a, and 3a. At Tᵛ1 where the deposit was seven feet thick there was a gradual change from coarse, thick pottery in the lower levels to finer, thinner pottery on top. Sherds from the bottom and top were distinguishable; those in the middle might represent a poor example of the latter or a good example of the earlier group and no definite line could be drawn separating them into types. Because the three types seem, on the basis of paste, to form a continuum, perhaps types 2, 2a, and 3a could be grouped into one ware.

The type 2, 2a, and 3a decorated sherds from these five sites were subdivided on the basis of predominate design element or, as in the case of punctates, on similarity of design technique. The following design classes were found:

Exterior notched: Plain or cord-marked sherds exhibiting rims notched on the exterior—either a plain or cord-wrapped-stick notch—occasionally with bosses on the outer surface.

Interior notched: Plain or cord-marked sherds exhibiting rims notched on the interior—either a plain or cord-wrapped-stick notch—occasionally with bosses on the outer surface.

Embossed: Plain or cord-marked rim and body sherds exhibiting bosses on the outer surface as the only design element.

Crescent stamp: Plain or cord-marked sherds exhibiting various types of plain crescent stamps and crescent dentate stamps, horizontally or vertically displayed.

Incised: Plain and cord-marked sherds with incised geometric designs, incised lines varying from 4.0 to 1.4 mm. in width.

Punctate: Plain sherds with hollow reed, angular and hemispherical punctates placed in horizontal or vertical rows.

Rouletted lines: Plain sherds with lines of rouletted or linear dentate stamp decoration placed vertically or horizontally.

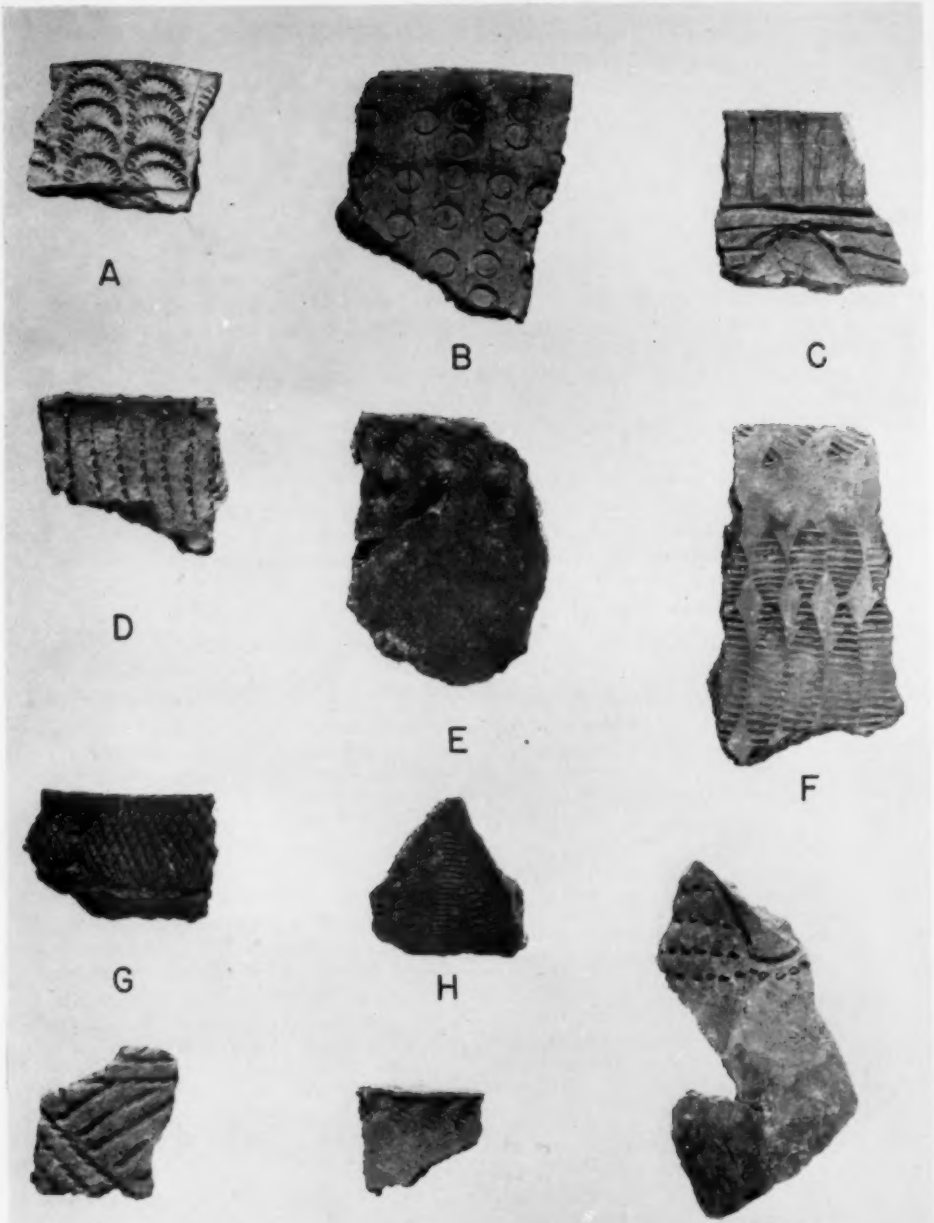

FIG. 102. Sherds from Fulton county sites exhibiting various designs: *a*, crescent stamp; *b*, punctate; *c*, incised; *d*, rouletted lines; *e*, cord-wrapped-stick impressed; *f*, snowshoe dentate; *g*, crude cross-hatched; *h*, rocker decoration; *i*, heavy cord impressed; *j*, weaver rim; *k*, zone decoration.

Zone decoration: Plain sherds with decoration consisting of rouletted lines or punctates in horizontal lines, vertical lines, and lines radiating from a common center, set off by wide trailing or incising.

Rocker decoration: Sherds with plain rocker or rocker dentate stamp along the rim.

Cord-wrapped-stick-impressed: Plain sherds with vertical cord-wrapped-stick impressions coming straight down from the rim, producing a decoration similar to a simple linear dentate stamp.

Pinch design: Plain or cord-marked sherds with pinch design near the rim.

Crude cross-hatching: Plain sherd with crude, coarse, cross-hatching immediately below the rim (only one sherd of this type was found).

Snowshoe dentate: Sherds with oval or snowshoe dentate stamp design.

Heavy cord-impressed: A sherd with decoration made by pressing a heavy two-ply cord into the soft clay.

Weaver rims: Plain or cord-marked sherds with square, rounded, or notched rims. These sherds fall at the thinner, harder end of the range of variation of the ware, and notches along the rims may be plain or cord-wrapped-stick.

In addition to these design classes, which are included within the ware described above, there are the following types present in these sites which were defined by Cole and Deuel (1937, p. 48):

Type 1: One sherd of Black Sand Incised type. (Cole and Deuel, 1937, p. 40).

Type 3: Three sherds were found which fit this type, one was zone decorated with red paint, one was Hopewell Incised, and the third was Baehr Zoned.

Type 5: Tampico type, cord-marked sherds, with punctate decoration along the rim and upper shoulder areas, and also cord-impressed decoration.

Once this ceramic analysis was completed the sites were arranged in an assumed chronological order. The upper part of the sequence was determined by the stratigraphy at T^{v}1. Weaver rims have been demonstrated to appear late in the Hopewell sequence, not only here, but also at the Weaver site dug by R. S. MacNeish. F^{v}574 is placed below because of the continuing decrease in Weaver rims and increase in Hopewell decoration. Below this are the two zones of F^{v}35 which have both Hopewell and Central Basin type sherds, and because the lower zone of F^{v}35 has more Central Basin sherds than the upper, F^{o}54 can be placed at the bottom of this series. The location of F^{v}49 on Figure 103 is perhaps the only one about which there may be some question. Judging from the pattern of the rouletted line decoration sequence, it may belong above T^{v}1 (11-15), however, it was located below it on this chart because of the trend in percentage of Weaver rims.

Each site, or zone within a site, in the sequence was arbitrarily made equivalent to a period of time, for the purposes of this study, with period I being the earliest and period IX, the latest. From Figure 103, which graphically depicts the variation in relative popularity of the various classes of design elements, we learn numerous important facts.

Crescent stamp decoration increases from period I to period III and then ceases. Punctate decoration increases from period I to period III and then decreases and is not found after period VI. Incised decoration is most popular in period I, and decreases until period III; it drops out and is found again in periods VI, VII, and VIII. Rouletted line decoration is first found in period II and increases until period IV where it is most popular, constituting 56% of the total; it decreases in popularity until period VI. There is another peak in the curve in period VII, and after that this design begins to die out. However, from period IV until period VII it is the most popular design technique in the series. Zone decoration begins in period II, and has its greatest popularity in period III; from then until period VII, after which it disappears, it remains relatively constant. Cord-wrapped-stick decoration is first found in period II; it has its greatest popularity in period IV; and the second peak is in period VIII. Rocker stamp decoration is found only in period IV and period VI. Weaver rims do not appear until period IV and then increase in popularity until period VIII; the decrease in period IX is due to the increase of Tampico sherds.

This seriation suggests a gradual intrusion of design classes assigned to Hopewell upon those assigned to Central Basin while the ware remained the same. There seems to have been a period when only Central Basin designs were produced, followed by a period when Hopewell designs came in and Central Basin continued. Then Central Basin decreased rapidly, almost dying out, but Hopewell continued on for a time.

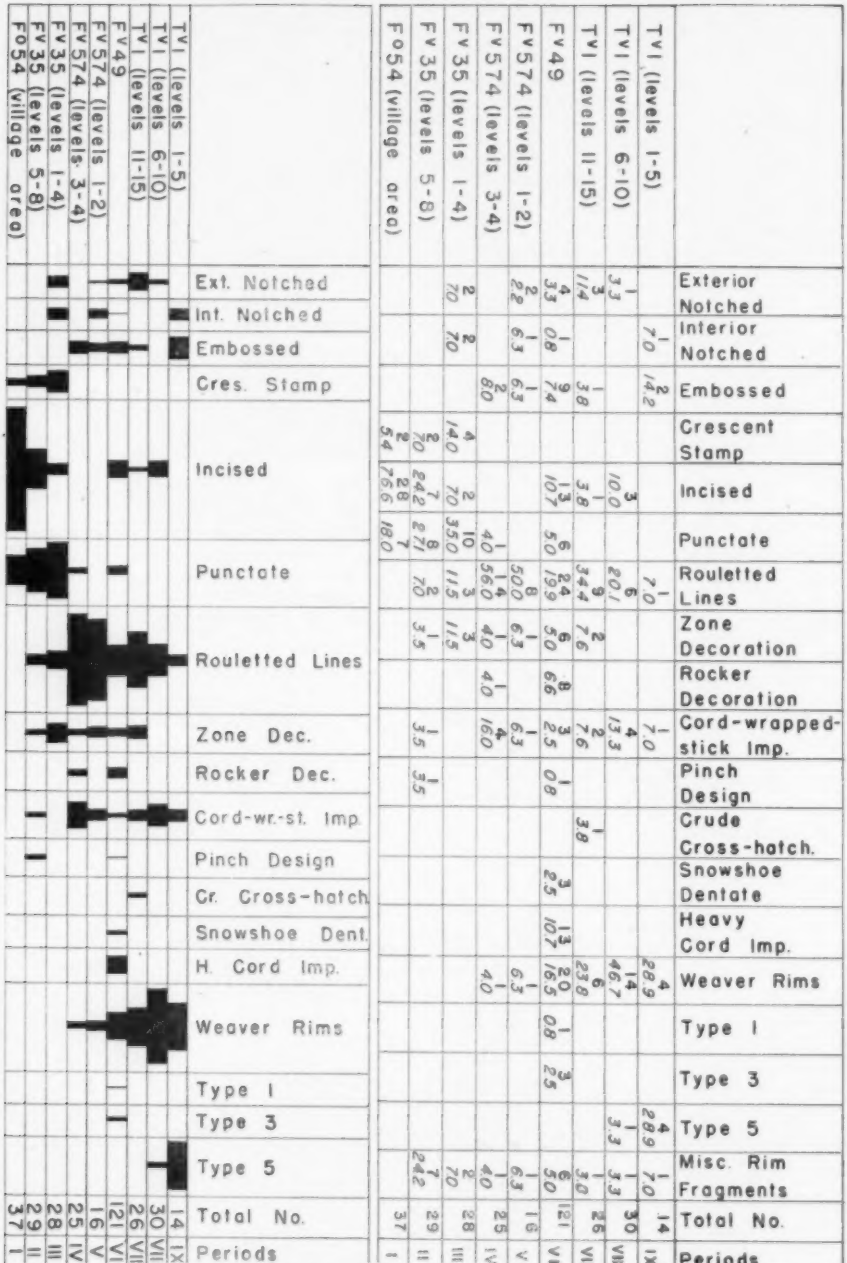

FIG. 103. Distribution of various design classes and pottery types in central Illinois sites. The upper chart gives actual sherd counts and percentages, the lower chart graphically represents the variation in relative popularity of various classes of design elements and pottery types.

Sites which are intermediate between the periods arbitrarily established here will undoubtedly be found, as well as sites which will not exactly coincide with any one point on the chart. Ct^{v}1, in Clinton county, was an example of the latter. In order to place it in time the various percentiles were plotted at the point where they intersected those trends on the chart. The average of these suggested that the Central Basin—Hopewell occupation at Ct^{v}1 was contemporary with Fulton county sometime between periods II and III, assuming that the two areas were in close contact and that they shared all decoration techniques equally.

In F^{v}49 three sherds were found which belong to type 3—one Hopewell Incised, one Baehr Zoned, and one zone decorated sherd with red paint. These are the only representatives of the ceremonial complex found in the sites analyzed. While it is impossible to base any conclusion on the presence of three sherds, the suggestion is that the elaborate Hopewell ceremonial complex comes rather late in the village sequence in this area.

The ceramic seriation presented here is based on small sherd counts (a total of 325 sherds in all) and is by no means conclusive. It will take more field work and larger collections to verify it. There is no evidence to indicate that the time periods arbitrarily established are of equal length; time span represented by periods I to V may be shorter than that from VI to IX. However, this seriation may prove to be a suggestion of the true chronological picture or at least a target for future research.

It would seem that the evidence for the overlap of Central Basin and Hopewell in Fulton county is overwhelming, and that there was no break between them. The suggestion presented here is that the Hopewellian village complex grew out of the Central Basin village complex in central Illinois as a result of either indigenous development or diffusion of ideas. The possibility of a migration of a new population into the area at that time seems to be ruled out because there is no change in the technique of manufacture of the pottery, only in design styles, and apparently no significant change in the non-ceramic complex.

BIBLIOGRAPHY

BLUHM, ELAINE A.

1948. "An Analysis of the Boulder Sites, a Study of Early Hopewell Occupation in Illinois." Unpublished Master's thesis, Department of Anthropology, University of Chicago.

COLE, FAY-COOPER AND THORNE DEUEL

1937. *Rediscovering Illinois.* Chicago: University of Chicago Press.

Chicago Natural History Museum
Chicago, Illinois
September, 1950

TUMULI IN SOUTHWESTERN PENNSYLVANIA*

EDMUND S. CARPENTER

IN the spring of 1791 a soldier in the army of Major General Arthur St. Clair, pausing on his march through western Pennsylvania to view a prehistoric earthwork along the Monongahela, wrote in his journal

> This ancient work, from appearances, must have been built many hundreds of years ago, but who were the people at that time inhabiting this country? for what causes were they built? Here I am at a loss, yet I am not alone: still that can be of no satisfaction to me; but on enquiries of this nature, the mind is not satisfied with *mere conjecture;* it requires more substantial food, the food of certainty . . . [The ruins] must, I think, be attributed to the workmanship of man . . . but who they were, from whence they came, at what period they arrived, or where they have passed to, I believe we must ever remain in ignorance (Anonymous, 1810, p. 23-4).

Considerable mystery still surrounded the tumuli fifteen years later when Thomas Ashe, Captain in the York Rangers and traveler through the Monongahela country, stopped to explore what he thought to be an Indian grave, while "the laughter of the multitude followed me from the town to gaze on my labour and delight in my disappointment" (Ashe, 1811, p. 16).

Although in Pennsylvania popular interest in the mounds was strong, no scientific explora-

* See footnote 1, p. 288, *American Antiquity,* Vol. 15, No. 4, 1950.

tion was attempted in southwestern Pennsylvania until 1886. In that year Mr. Charles M. Smith, Smithsonian archaeologist, searched the wooded banks of the Monongahela for village and burial sites. One major excavation, the Crall Mound, was accomplished and a survey of other tumuli made. Mr. Smith's lengthy but interesting reports divide themselves between accurate descriptions of mound and cairn exploration and complaints that his delayed pay-checks left him "without laundry or lodging." [1] Ten years later the Carnegie Museum of Pittsburgh initiated a series of mound explorations, beginning with the famous McKees Rocks Mound. This latter work constitutes the backbone of mound research in the area.

While perhaps relatively and absolutely more prehistoric cairns and earthworks originally stood in southwestern Pennsylvania than in any other section of the state, our knowledge of most of these extremely important tumuli still remains a total blank. Vandalism appears to have been the main contributing element in this paradoxical situation. Other than at McKees Rocks, not one mound in the area, to the writer's knowledge, has ever been explored by men who knew exactly what they were doing or who saw fit to preserve data for future generations. Added to this difficulty has been the general paucity of artifacts in the mounds, particularly salient types. Most of the specimens recovered have been rather drab and nondescript, certainly no match for the spectacular discoveries made in Ohio and West Virginia tumuli.

But to offset this discouraging picture there is at least one bright chapter—the McKees Rocks Mound exploration. Dr. Frank H. Gerrodette, director of the Carnegie Museum and leader of the expedition, was truly a pioneer in archaeology. Among the better scholars of today his field techniques are commonplace; in 1896 they were virtually unknown. And furthermore, they were completely misunderstood by all but a few. His labors are the subject of this report. Throughout the entire study the cooperation that I received from the Carnegie Museum staff was completely without precedent in my experience. In particular I express my thanks to my friendly host and patient correspondent of many years, Mr. James L. Swauger, archaeologist at Carnegie Museum.

[1] Smith, Charles M.: Letters to Cyrus Thomas, on file in the Archives of the Bureau of American Ethnology, Washington, and the Library of the American Philosophical Society, Philadelphia. A brief summary of this work appeared in Thomas (1894, pp. 494-9).

McKEES ROCKS MOUND

Pennsylvania's largest and perhaps most famous tumulus, the McKees Rocks Mound, stood on a truly impressive bluff at the junction of Cartier's Creek and the Ohio, in Stowe township, Allegheny county, a few miles down river from the forks at Pittsburgh (Fig. 104, *a*). Few early explorers in this region failed to mention the imposing Indian mound surmounting the "Rocks," and their otherwise rather prosaic itineraries of distances overcome and sleeping accommodations available frequently contain exaggerated descriptions and fanciful speculations on the origin of this ancient structure.

Through a fortunate circumstance the mound appears to have been left comparatively untouched until a rather late date,[2] and it was not until 1885 when a western portion of the tumulus passed into the hands of David K. McGunnigle that any real excavation was attempted.[3] In August of that year Mr. Richard Bennett, "an enthusiastic amateur archaeologist, ornithologist and herpetologist, having grown tired of studying birds, snakes, etc., . . . threw himself with ardour into the dissection of the mound." [4] With the aid of a small crew, apparently recruited from the nearest saloon, a tunnel was run in from the western side (Fig. 106), uncovering at first only "flints, arrowheads, etc., common to the common Indians" [5] and finally an adult skeleton in fair condition that lay near enough to the outer edge so that the excavations were still being conducted by sunlight. "Close to the skeleton was found a piece of something that looks like a highly polished stone, cut in such

[2] Pittsburgh *Dispatch*, Aug. 15, 1885.

[3] Pittsburgh *Dispatch*, Aug. 15, 1885; Boston Sunday *Herald*, Aug. 16, 1885; Rochester (N.Y.) *Democrat and Chronicle*, Aug. 20, 1885; Pittsburgh *Times*, Aug. 5 and Aug. 8, 1896; McKees Rocks Mound field notes by Gerrodette and Harper, and report of Thomas H. Johnson, Carnegie Museum files, Pittsburgh.

[4] Pittsburgh *Dispatch*, Aug. 15, 1885.

[5] Pittsburgh *Dispatch*, Aug. 15, 1885.

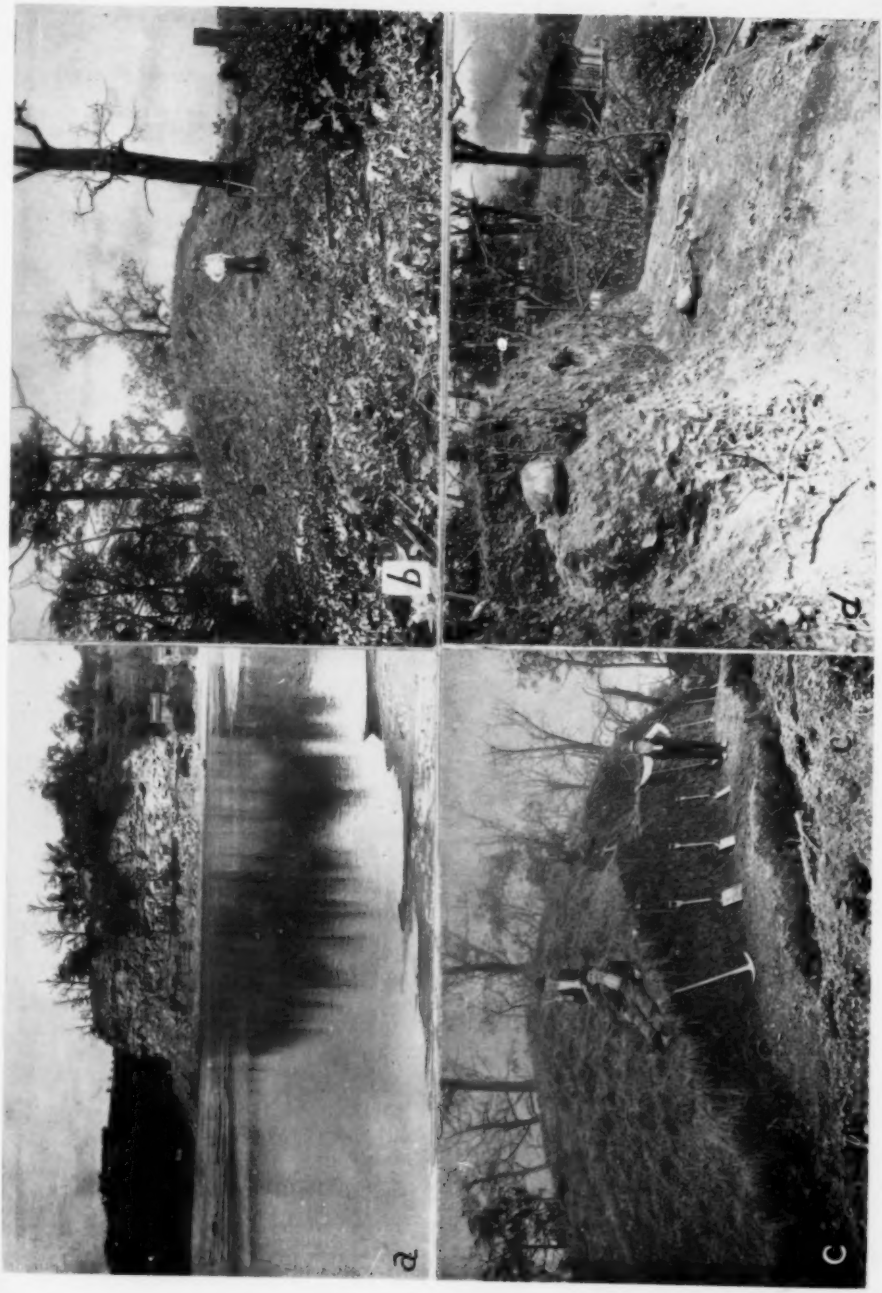

FIG. 104. Various views, McKees Rocks Mound.

shape that indicates that it has a use of some kind, sacred or secular. Several holes were drilled through it, and it has been broken across the line of perforation where cohesion has been weakened. The stone is about three by six inches in size, and three-eighths of an inch thick. It somewhat resembles, in grain and polish, the stones used in the honing of razors."

In June of 1896 Frank H. Gerrodette, brilliant young student of Harvard's famed archaeologist, Frederick Ward Putnam, became the director of the newly-opened Carnegie Museum of Pittsburgh, and plans were immediately laid for the exploration of the McKees Rocks Mound. Although this "special research," completed at a cost of $712.60, was originally designed to add color to a Founder's Day celebration, it soon became a national scientific event. Gerrodette, with Thomas Harper of the Western Pennsylvania Historical Society acting as first assistant, began work on July 18, 1896, and continued excavations until September 19, at which time he was forced to resign his position. A collection of 331 items was accessioned by the Museum on September 30th of the same year and in part may be seen today on display in the Carnegie Museum. Gerrodette appears to have been a scholar of real intellect, a man possessing an excellent background and thorough training—yet an erratic individual whose personality left him ill-prepared for the difficulties that were to come.

Pittsburgh regarded the exploration of her famous Indian mound with a curiosity that made an amateur antiquarian of almost every citizen. Just who was buried in this ancient tumulus nobody seemed to know, but no one lacked a theory. The newspapers showed a lively interest in the mystery, and headlines soon alleged that the skeletons were actually those of cholera patients, "floaters," or the bodies of people drowned in the river and Negro slaves—and the Pittsburgh *Dispatch* cried out against this "hoax and ruthless desecration." [6] A weird assortment of individuals (including an Englishman named "Old Brandy" who was laid to rest with his favorite bottle, a giant ferry man, a slave called "Old Sweetcob" and a host of others) were declared buried in the mound,[7] but after a detailed investigation it was revealed that all of these individuals were either buried elsewhere or, in the case of three, still very much alive. And no bottle! [8]

The more conservative *Times* entered the dispute on the side of the archaeologists and rather pointedly remarked, "There are always several men in McKees Rocks who, whenever they get a glass or two of beer will make affidavit that they have buried friends in the mound." [9] Moreover, the reputation of McKees Rocks as a community of dubious moral stability was widely recognized in the Pittsburgh area, a reputation which it has largely lived down. Still, the stories were well "documented" and sounded so plausible that they received much credence, and to refute their widespread acceptance a public meeting, with F. W. Putnam and W. J. Magee as the principal speakers, was held on September 2, 1896. In addition to Putnam and Magee, Charles F. Trill, Thomas Wilson and several other nationally-known archaeologists visited the dig and submitted reports, in which all concurred on the antiquity of the graves. Most fortunate of all, a Thomas H. Johnson, geologist, made a detailed examination of the mound profile when the workers were five feet from the center line, and many of the observations contained in his excellent report have been incorporated in this account. But though the evidence piled up against the exponents of the "floater" story, doubts had been generated in the minds of readers and the idea would not die. As late as 1923 one Pittsburgh newspaper casually remarked that the McKees Rocks Mound skeleton on display in the Carnegie Museum was really that of a "Mrs. Jones." [10]

To add to these difficulties, Gerrodette was constantly harassed by hundreds of sightseers who daily visited the site to "howk at the face of the mow," as one of the workmen phrased it,[11] and then on September 14 the workers struck for higher pay and "the cause of Amer-

[6] Pittsburgh *Dispatch*, Aug. 23 and 24, 1896.

[7] Pittsburgh *Dispatch*, Aug. 23 and 24, 1896; Pittsburgh *Times*, Aug. 8, 25, 26, 27, 1896.

[8] Pittsburgh *Times*, August 25, 1896.

[9] *Ibid.*

[10] Pittsburgh *Pictorial*, Aug. 25, 1923.

[11] Pittsburgh *Times*, Aug. 8, 1896.

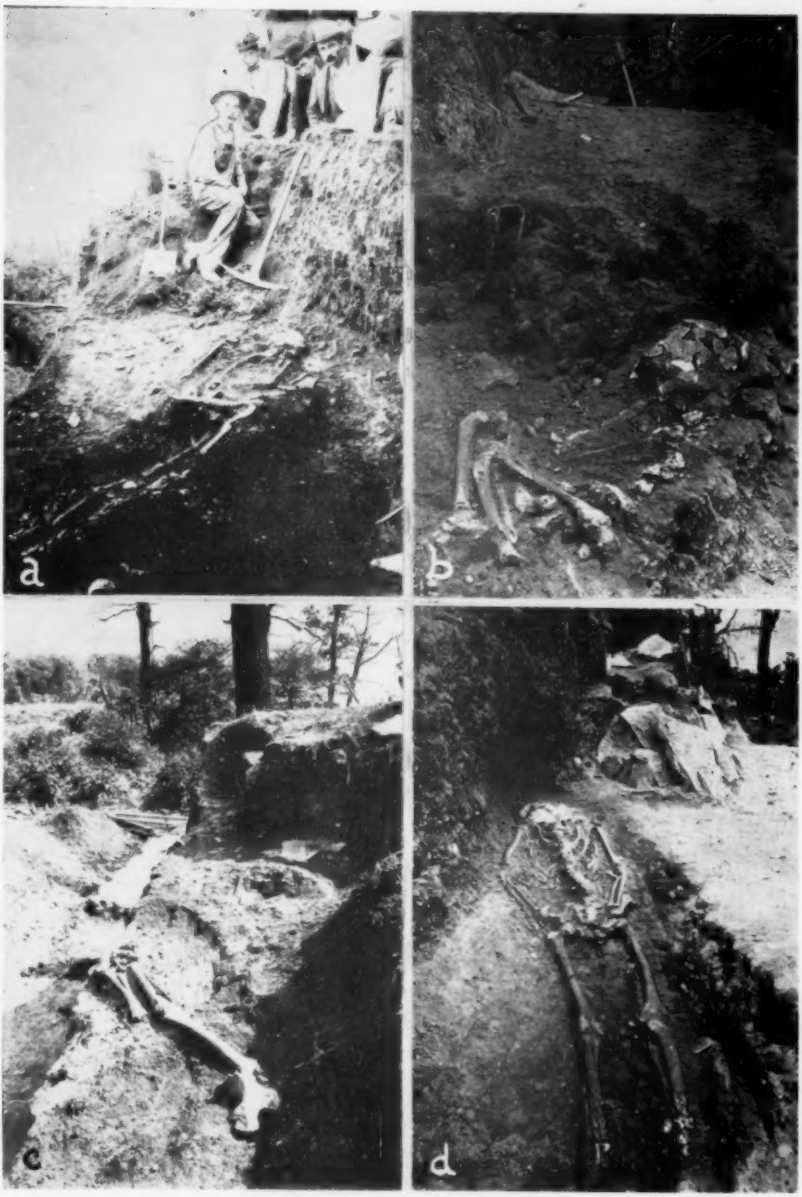

FIG. 105. Excavation details, McKees Rocks Mound.

ican labor." [12] Worst of all, the McGunnigle heirs refused to have their section of the mound explored,[13] and finally a bitter feud of jealousy—all of which was aired in the newspapers — developed between Gerrodette and his competent but domineering assistant, Harper.[14] In despair the work was abandoned before completion, the mound restored and Gerrodette's resignation accepted. This is the last we hear of the "little professor"; with the close of the dig at McKees Rocks he apparently left the field of archaeology forever.

The meticulous detail and extreme care with which the explorations were conducted reflect the teachings of Putnam and indicate that Gerrodette anticipated modern methods of excavation by many years. After first clearing the site, a 5 foot grid system was staked out, and the mound, found to measure 85½ feet in diameter and 16½ feet high, was photographed and surveyed (Fig. 104, *b*). Beginning on the eastern side, parallel trenches running north and south were cut into the tumulus by stripping down the earth in layers (Figs. 104, *c*, 108, *a*). A detailed account of the excavation was kept, profile maps were drawn at 5 foot intervals, burials were photographed *in situ* and their positions plotted on a map, and finally a catalogue giving to the inch the exact horizontal and vertical location of every find was prepared. Unfortunately, not all of these records are now available. Gerrodette left before arranging his notes and publishing the report that was planned, and there is much to be desired. All of the profile maps and many of the photographs are missing. The catalogue notes from No. 244 to No. 331 are lacking, and only one half-finished map of the site is to be found. Most disappointing of all, the vast majority of specimens recovered from the mound fill have disappeared, at least temporarily. It seems quite likely that much of this material will be recovered in time, but for the present there exist only copies of the Gerrodette-Harper notes; statements by Johnson and Putnam; a copy of the catalogue from No. 1 to 78 and 100 to 244; 12 photographs; an incomplete map; all of the recovered skeletal material; a restored cist and collection of mollusca shells; and some of the specimens,

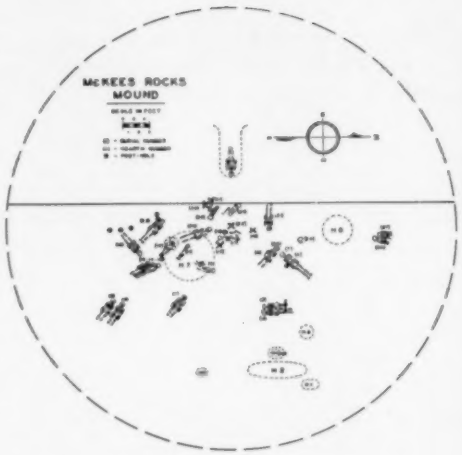

Fig. 106. Mound plan, McKees Rocks Mound.

most of which are shown in Figures 109-112, *b*. Newspaper accounts that appeared in the Pittsburgh *Times* almost daily during the excavations are surprisingly detailed and apparently quite accurate, frequently containing lengthy statements by the excavators and extracts from their field notes. These data plus the discovery of one of the missing maps in the hands of a private collector have greatly aided in the

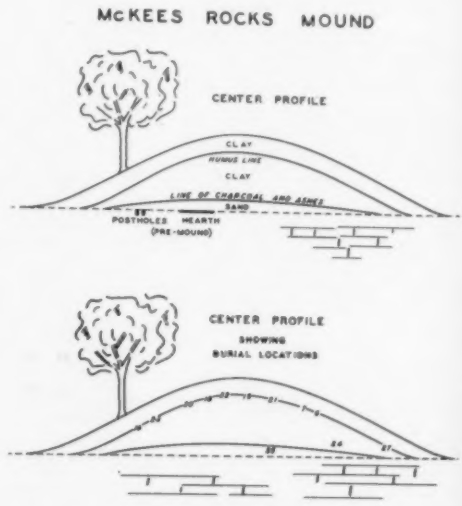

Fig. 107. Sections, McKees Rocks Mound.

[12] Pittsburgh *Times*, Sept. 15, 16, 18, 1896.

[13] Pittsburgh *Times*, Aug. 6 and 29 and Sept. 12, 1896.

[14] Pittsburgh *Times*, Sept. 17, 18, 19, 1896.

preparation of Figure 106. Best of all, Charles Snow of the Department of Anthropology, University of Kentucky, has kindly studied the skeletal material, and his findings and descriptions are incorporated in the burial notes. Other than this, the picture is obscure, but it seems doubtful that should part or all of the missing data be found they would in any way contradict this report; rather they would merely augment and broaden our picture.

Eight hearths and the remains of approximately forty individuals were uncovered and described. The burial notes are presented here in the order and with the numbers given by Gerrodette, while data on sex, approximate age and description of the skeletal remains come from the laboratory report of Snow.

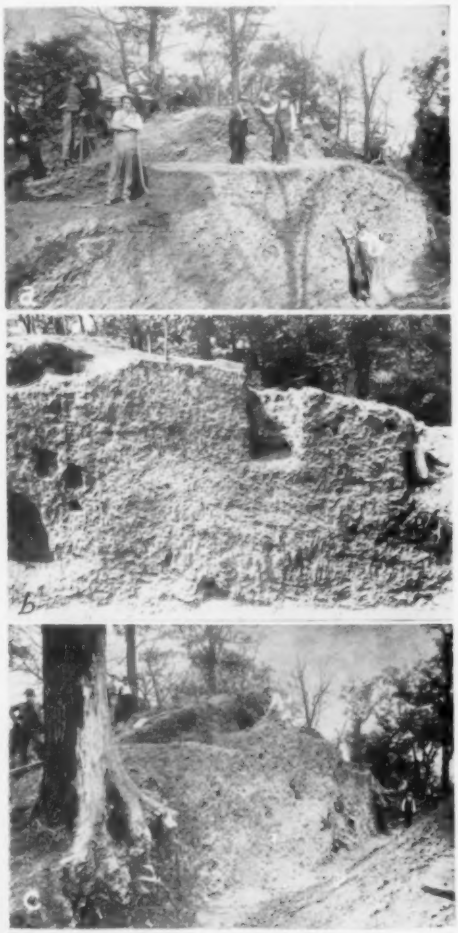

FIG. 108. Excavation details, McKees Rocks Mound.

BURIALS

Burial 1: Adult; extended, head toward center, depth to skull 8′, to legs 8½′; condition very poor, bones below femurs completely decayed.

Burial 2: Female of about 21 years; extended, facing east with head to south; loosely flexed on right side; head slightly elevated; condition poor. The skull of burial 2 lay partly upon the shoulder of burial 3, and the arms of No. 2 were thrown over the left arm of No. 3. The presence of a flat stone above the skull appeared accidental.

Burial 3: Female of about 21 years; depth to skull 3′3″; facing east in approximately the same direction as burial 2; head to south; body twisted slightly on back; head slightly elevated; condition poor; probably contemporary with burial 2; cremated remains, human and deer, catalogued with burial.

Burial 4: Female; age about 22 years; dental caries; depth to skull 3′2″; extended, on back; head toward mound center; facing west (?); condition poor, bones below knees greatly decayed.

Burial 5: Adult; depth to skull 3′2″; extended, on back; lay beside, and probably contemporaneous with, burial 4; condition poor; head toward mound center; facing west (?). Burials 4 and 5 lay on the outer edge of a large black stratum of strained earth and charcoal that extended through the mound, and near the two skulls there was uncovered evidence of fire.

Burial 6: Female of about 22 years; skull 3′ deep, elevated about 6″ above feet, and lying on pelvis of burial 7; condition poor; the cranium, vertebrae, and pelvic bones apparently lay piled in a vertical line and suggested to the excavators that the body had originally been interred in a sitting position, with legs extended. It was noted that if burial 6 had been laid back it would have occupied the same postion as burial 7. The remains of an infant were also present, and just northwest of, and intermingled with, the fragments of skull No. 6 or close to the right hand of burial 7 lay the sherds of a 2-quart pottery vessel. The Pittsburgh *Times* of August 11, 1896, describes this pot as a crumbling yet restorable vessel, 8″ in diameter, undecorated but with a finely turned brim. The *Times* further records that large flat stones covered the crania of burials 6 (Fig. 104, *d*) and 7 (Fig. 105, *a*).

Burial 7: Adult; extended; head toward center; pelvic and leg bones of burial 7 lay beneath and aligned with these same bones of burial 6. Probably contemporaneous, the two skeletons were in about the same state of preservation, and the feet of both were missing.

Burial 8: Adult; estimated age 14-20 years; dental decay; depth to skull 14″, to pelvic bones 2′6″; skeleton surrounded by flat stones that formed a crude cist from which the skull protruded above, the legs below; the pelvic bones lay beneath the skull which rested on the top of the stone slabs; condition very poor, possibly disturbed. In contact with the west side of the skull lay a small, nearly complete pottery jar, reported by the *Times* of August 11 to be black, about 4″ in diameter and finely turned; and by the *Dispatch* of the same date to be "baked with shells." On the pelvic bones and femora lay the remains of a child of about 30 months with the second deciduous molars nearly forward.

Burial 9: Adult; flexed on right side; headed north; facing west (Fig. 105, *b*).

Burial 10: Large male of about 25 years; extended; 18″ deep; condition poor; skull and feet not recovered; stone slabs above skeleton from the pelvis up.

Burial 11: Young adult female; probably extended; depth 20″ but evidence of erosion suggested original depth of approximately 3′; only the remains shown in Figure 105, *c* were present.

Burial 12: Merely a heap of human bones consisting of the larger part of a male skeleton, 18-23 years; 2′ deep.

Burial 13: Robust male of 35-40 years with very large brow ridges; depth to skull 3′7″; extended on back with head toward mound center; condition poor. Burials 13, 14, and 15 lay close together in a confused mass.

Burial 14: Rather flat-faced, long-headed female of about 21 years; skeleton headed toward the mound center, but the cranium was found turned completely around; depth to skull 2′10″ — which was said to be 2′6″ above (probably from) the crania of burials 13 and 15.

Burial 15: Male of about 25 years; extended toward mound center; depth to skull 2′7″.

Burial 16: Young adult male; extended in cist; headed northeast; condition very poor; stone slabs surrounded the sides of the skeleton and one lay above, another below.

Burial 17: Very large robust male of about 25 years with undeformed, long-headed cranium and very prominent inion; lying extended on right side; headed south; skull 3′ deep, elevated about 6″ above the other bones; burial enclosed on sides and top of stone slabs.

Burial 18: Female of about 21 years; cranium undeformed; position and fragmentary condition of the remains suggested that the burial had been previously exhumed and carelessly thrown back; burial apparently lay in stone cist with slab sides and possibly a cover.

Burial 19: A confused heap of disarticulate bones of a young adult female lying in a space roughly 18″ x 20″ and imbedded in the soil at an angle of 45 degrees; depth 3′; depression in mound over grave and the position of the burial suggested earlier disturbance.

Burial 20: Female (?) of about 22 years; diseased lower shaft of right humerus, swollen; burial extended with head toward the center; depth to skull 3′7″; condition good; bones of feet missing (Fig. 105, *d*). A Pittsburgh *Times* article of August 22 further notes that the burial lay enclosed in a stone cist in an inclined position with the lower limbs 6″ below the skull.

Burial 21: Male of 15-17 years; extended with head to the east; depth 5′; condition very poor. The thin, banded slate gorget shown in Figure 109, *g*, lay between the femora.

Burial 22: Fragmentary remains of a young adult male (?) lying in a confused heap 2′ x 18″ and enclosed in a slab cist with sides, roof and floor; burial partially disturbed, depth 3′6″.

Burial 23: Male of about 23 years; extended with head toward center; depth 4′; calvarium turned around and up so that the top of the skull faced the feet; condition very poor.

Burial 24: Male of about 25 years; a few cervical vertebrae and an isolated cranium, with pronounced occipital deformation, facing upward; depth 8′6″. An undeformed male skull of about 23 years was catalogued with this burial but is not mentioned in the notes.

Burial 25: Male of about 28 years; extremely long, undeformed vault; limb bones indicate man of large size; lying flexed on left side with knees drawn up close to body; headed south; facing west; depth 7′; condition poor; enclosed in stone cist along with burial 27.

Burial 26: Female (?) of about 24 years; extended with head toward the northwest; condition good; depth 15′4″. Near the head lay a broken grooved axe (similar to Fig. 111, *h*) and 4 bone perforators (Fig. 110, *f-i*); around the neck were 357 conch columella shell beads of various sizes (Fig. 109, *b, c*); upon the pelvis were found 2 bone flakers (Fig. 110, *b, c*), a slate gorget (Fig. 109, *a*), a scraper, 2 spear points of flint, a canine tooth of a bear encased in a copper sheath and preserving a small scrap of coarse woven fabric, (Fig. 109, *d*); and at the feet 160 Marginella shell beads (Fig. 109, *f*).

Burial 27: Male of about 18 years, cranium undeformed; lying flexed on right side with head to the southeast; facing east; depth about 7′. The bones lay intermingled with the remains of burial 25, and the 2 skeletons were enclosed by a slab cist with sides and cover.

Burial 28: Male of about 22 years, small occipital deformation; vault "appears to be typical Adena"; flexed on right side; arms crossed on pelvis; head to the northwest; facing west; depth to skull 1′6″, to feet 1′8″; condition good.

Burial 29: Large male of 27-30 years; flexed on right side; left arm bent back upon itself; artificial (?) hole in the right ramus; condition poor; depth to skull 2'8", to feet 2'10".

Burial 30: Cranium, ribs and vertebrae of a female of about 20 years; condition poor, depth 2'8". The remains of a child of about 20 months lay with this skeleton.

Burial 31: Cremated human skull and long bones of a young adult (?) male; calcined animal bone fragments; none of the human or animal calcined bone fragments show outside checking; depth 2'. Both flat stones covering the burial and the earth around and near the bones showed evidence of fire.

In summarizing the data on the McKees Rocks Mound skeletal material Snow has noted that: "the few measurements which were determined indicate that there were several cases of physical types represented very much like that in Hopewell. They are several individuals of large size including the undeformed long skull vault of Burial 25. There are several examples showing occipital deformation, in one case to a pronounced degree. If I were to say anything definite about this scanty material, it would be to the effect that it resembles the Hopewell physical type, more than any other." [15]

HEARTHS

Hearth 1: A fairly well-defined bed of charcoal and ashes about 3' long and 4"-5" thick; depth 2'.

Hearth 2: Nearly 11' in diameter; 3' deep; lying at the base of the mound fill and above, and on the edge of, the stratum of sand.

Hearth 3: A fairly large body of ashes 18" x 2' in diameter and about 6" thick; depth 2'.

Hearth 4: Fireplace 2' long and 6" thick with stones underlying it; depth 2'7". To the north of this hearth appeared a line of burned earth resting upon the stratum of sand which had been hardened by the fire above.

Hearth 5: Much larger than, and lying beneath, hearth 4; 2'6" x 3' in diameter; composed of numerous flat stones laid in a rude pavement and showing evidence of fire; charcoal plentiful.

Hearth 6: Apparently merely a darker concentration of charcoal, ash and stones that, like most of the other hearths, actually lay within the large black stratum found throughout the mound.

Hearth 7: Ash bed on original ground surface consisting of what seems to have been wood ash burned white, "accompanied by the usual amount of Unio shells and fragments of animal bones."

Hearth 8: Dark gray material 5'-6' long and 4"-6" thick located about 3' above the mound base. The layer consisted of a fine, crumbling, incoherent substance, apparently humus, which in turn was covered by a layer of white ash about ⅛" thick. Bone fragments, some calcined, lay in the center.

MOUND STRUCTURE

A thin mantle of earth covered the rocks of the cliff, and directly on top of this the mound was built. Keen observations by Gerrodette, Harper, Johnson, and Putnam have left us detailed data on stratigraphic evidence indicating several epochs in the construction of the tumulus. Constant cross-checking of the notes of each observer demonstrates such a remarkable consistency that the following reconstruction can be presented with some assurance: No duff line separating the mound earth from the original ground level was observed, and it is quite possible that a floor was prepared by removing all humus accumulations. However, at least one hearth, number 7, lay on or immediately below the old living surface and suggested first, that the area had previously been used for habitation purposes and second, that clearance, if any, was at best superficial.

Five post-holes, each circular, about 2 feet deep and 10 inches in diameter, filled with a loose dry black mould and sunk from the mound floor into the earth below, were uncovered at the locations shown in Figures 106 and 107. This small number of post-holes is perhaps more apparent than real, for though excavation of the first few trenches was often carried down to a depth of about one foot below the original sod line and at times even to bed rock, the depth of the trenches soon decreased, and it was not until the excavators were within 5 feet of the center line that the explorers, acting on the advice of Putnam, excavated down to and below the original ground level.

A broad low, rounded mound of "fine homogeneous river sand, almost clayey" composed a basal layer roughly 65 feet in diameter with a maximum center height of about 3½ feet and an approximate center immediately

[15] Snow, Charles E.: Personal correspondence, October 4, 1947.

south of burial 26. Only a few scattered artifacts and but one skeleton, burial 26, the central and most richly supplied grave, lay within this stratum. Completely covering this primary sand mound was a distinct and unbroken layer of black earth, ash and charcoal, about 5 inches thick or more, surrounded by hard-burned earth. Directly above this the principal mound structure was built, using clay as the chief material, mixed with fragments of stones, some rounded and waterworn, but more unworn and angular. Much of this earth must originally have been midden from an adjoining village site, for it included quantities of industrial goods, animal bones, fire-cracked stones, charcoal and ash. There is the suggestion, too, that during its lowest stage the mound was used as a habitation site or perhaps for other purposes, since a number of distinct hearths or fire-beds were uncovered within the black stratum that capped the layer of sand.

About three to three and a half feet below the present mound surface there is a well-defined formation of soil, indicating that the mound was originally smaller than at present, and was subsequently enlarged. The majority of burials uncovered, particularly those enclosed in cists and the single cremation, lay roughly 3 feet more or less beneath the mound surface and were apparently laid in shallow graves scooped from the surface of this center mound section and covered over by the general enlargement of the structure. The few burials lying considerably deeper may have been interred from above or, since no evidence of intrusion or pitting was observed, more probably laid on the surface while the central section was undergoing construction. Possible variations existing between the artifacts from each of these 3 main layers (sand, central and top) must remain unknown until the material can be recovered and studied. However, it might possibly be of some significance to note that the cist burials were generally limited to the top layers as were the 2 pottery vessels uncovered with burials and the Adena-like skull of burial 28, while gorgets (3) were present only in the 2 lower levels.

The evidence adduced permits several possible interpretations. One is that the central burial was laid on the floor of a large circular house standing in the habitation area and a small primary mound of sand then erected within the house to cover the grave. Following this the house was intentionally destroyed by fire with the result that a convex layer of burned earth, charcoal and ashes covered the sand layer. Hearths here might be interpreted as evidence of burial fires and funeral feasts.

FIG. 109. Artifacts, McKees Rocks Mound.

A secondary and larger mound was next erected in two stages directly over the primary mound. With the addition of a few burials and successive increments of earth, the first stage of this enlargement was seemingly marked by a reasonably continuous and uniform growth. For a period of unknown duration construction must have ceased while the mound was left to weather and accumulate a humus zone on its surface, and then the final re-enlargement was made to cover a number of additional burials, many of which were enclosed in stone cists. Such a procedure would conform in many ways with certain Adena practices as outlined by Webb and Snow (1945).

A simpler and perhaps more probable explanation might be that on the surface of a village site there was erected a stratified mound of three layers and that following the construction of the primary layer the surface of the low-lying mound was temporarily occupied as a habitation area. Speculation might suggest still other interpretations.

At well over 70 locations scattered throughout the mound there occurred either isolated or, more frequently, clusters of fragmentary animal bones, often in association with Unio shells and charcoal, and occasionally calcined. While deer and rodent remains by far and away predominated, at least one turtle shell fragment was recovered, and Snow has noted a few bones of a large sized hoofed animal, presumably elk. In over 15 other instances groups of, or lone, Unio shells found scattered through the mound were saved and their locations recorded. Perhaps most interesting of all are some 23 single or groups of human bones uncovered at various points during the excavation. Unquestionably some, if not most, of these remains belong to burials already described, but others undoubtedly represent the scattered fragments of skeletons for which we have no records. Additional evidence of tooth decay and a diseased left tibia were present.

After cutting down the final trench, thereby excavating 5 feet beyond the center line, an excavation was made at the center, 8½ feet square, down to bed rock, but nothing further was discovered. With this final attempt to locate what the papers called "the hidden treasure of the last King of the Wyandottes" explorations ceased.

ARTIFACTS

It will, perhaps, be of aid to the reader to consult Figures 109 to 112, *b*, which illustrate most of the artifacts recovered that are still available for study. In Figure 109, *e*, a well-fashioned and polished hematite cone, apparently from the mound fill, is of considerable interest, while the delicate bone awls or skewers (Fig. 110, *f-j*), unworked antler tine (Fig. 110, *a*), and antler "flakers" (Fig. 110, *b-e*) deserve mention. For heavy stone implements (Fig. 111) there are 4 celts (*b*, *e*, *g*, *i*), one of which, *b*, is thin and highly polished; 2 pecked stone spheres of unknown use (*a*, *d*); a grooved axe (*h*); a whetstone (*f*) and a waterworn stone perhaps put to the same use (*c*). Not illustrated but on display at the Carnegie Museum are the following additional pieces: 3 celt fragments; 2 pebble hammerstones; 3 stone spheres; and a grooved axe fragment, the last probably from burial 26. Unfortunately, only 24 chipped stone specimens, several of doubtful provenience, remain, yet even so, a variety of forms are present (Fig. 112, *a*).

The available portions of the catalogue offer valuable data on certain of the artifacts from the mound fill and their locations in the tumulus. About 85 arrowpoints are listed along with 6 spear heads; 1 drill; 1 celt; 1 rubbing stone; 6 potsherds; 1 deer bone implement; and fragments of a large pottery vessel found imbedded in burned clay about 2½ feet above the mound floor and roughly below and between burials 9 and 12. Nine pieces of bone awls (Fig. 110) along with a grooved axe and a pitted stone were found in a space about 18 inches in diameter, 9½ feet deep and located east of and below the right shoulder of burial 7, while 17 additional fragments of bone needles or awls were uncovered just southeast of burial 8 at a depth of 18 inches.

POTTERY

Sherds from four interesting pottery vessels are available for study. The first is represented by five body sherds from a thick (.4-.75 inch), buff-colored, flat-bottomed vessel, smoothed on both surfaces and tempered with a coarse grog of igneous rock. The angle of slope between the sides and basal section is indicated in Figure 112, *b*, a.

The second vessel, probably from burial 6, is nearly complete, but its extremely fragile

condition makes restoration dangerous. The vessel is roughly 8 inches in diameter at the rim, corded on the exterior and smoothed within, .2-.25 inch thick, and tempered with limestone, most of which has leached out. Though the majority of the sherds are stained and smoke-blacked, a few indicate that the original color was dull brown. The flaring rim with thickened outer ridge is illustrated in Figure 112, *b*, b.

Vessels 3 and 4 are indicated by but one sherd each. The first is a nearly flat, buff-colored sherd, about .35 inch thick with coarse igneous rock temper (Fig. 112, *b*, c). It shows cording on the exterior and a deep and distinct fabric impression within. In many ways the sherd resembles the Vinette I type.

The final sherd is brown, shell-tempered, and .2-.25 inch thick (Fig. 112, *b*, d). The interior is smooth as is the exterior below the flaring rim. Above this are cord impressions, possibly from twisted strands encircling the neck or, doubtfully, from a cord-wrapped paddle.

It will be readily noted that the first three vessels belong to traditions quite distinct from that of the last described sherd. The former are somewhat reminiscent of certain early styles, Fayette for example, and possibly related to Adena forms, although actually these traditions were quite widespread and characteristic of a number of early manifestations. On the other hand, the shell-tempered sherd appears to be of a much later (Monongahela?) pattern, and though no stratigraphic data are available, it may actually have been intrusive. A questionable referénce to shell-tempered pottery with the shallow, cist-encased burial 8, has already been cited. It is possible that limestone or steatite temper was mistaken for shell, or it may be that a considerable gap in pottery traditions separates certain of the burials.

DARLINGTON MOUND

On a hilltop in O'Hara township, Allegheny county, overlooking the junction of the Allegheny and Monongahela Rivers in Pittsburgh there stood until late years a mound on the farm of a Miss Darlington and Mrs. Edith Darlington Amon of Guyasuta. More specifically, the tumulus was located just 20 feet east of the Highland Park bridge, bordering a freight yard, and at the time of its exploration

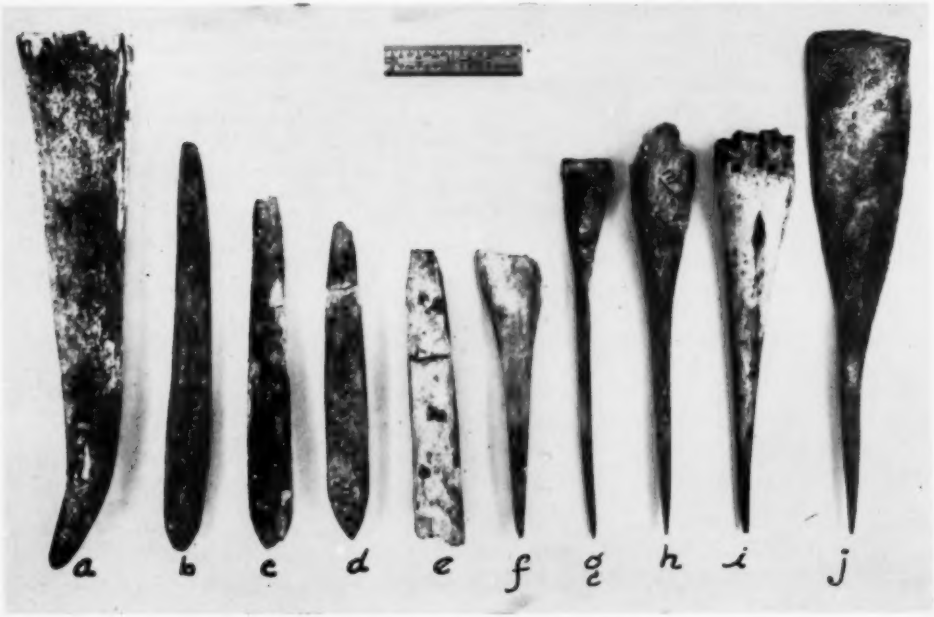

Fig. 110. Artifacts, McKees Rocks Mound.

in 1918 by the Carnegie Museum of Pittsburgh it was covered by a variety of trees and shrubs.[16] Other than this, little is known of the mound's exterior.

Near the center of the structure and at a depth of 5 feet lay 2 closely flexed skeletons headed east, one facing north, the other south. Both were removed intact by the use of plaster jackets and may be seen today in the Carnegie Museum. What appears to have been a stone cist, containing only the jaws of a burial some 18 inches below the top stone, was located southeast of the flexed skeletons and close to the surface of the mound. Six "disturbed burials," consisting of anything from skulls and accompanying bones to isolated fragments of limb bones, in addition to an arrowhead, an unfinished stone "hatchet" and some bird bones, were found at various points throughout the mound. In the northern section of the tumulus an extensive layer of large stones, possibly a pavement or mound reinforcement, was uncovered.

[16] Guyasuta Mound Ms. on file at the Carnegie Museum, Pittsburgh.

OAKMONT MOUND

A large, tree-covered mound located on the farm of a Major Speer at Oakmont, just north of Pittsburgh, in Plum township, Westmoreland county, was partially explored by the Carnegie Museum staff on October 5, 1895. The mound was nearly circular, 50 feet in diameter, 5½ feet high, and lay on rising ground known as the second river terrace. By digging a trench "30 feet long across the eastern edge of the mound, continuing the same through the western edge at a depth of 6-12 feet below the original surface" the excavators uncovered a stone cist that had been previously opened, a skull and numerous human bones, a "large number" of broken and unfinished arrowpoints, two celts, a sinker and hammerstone, and a group of bones from some large animal.[17]

[17] Oakmont Mound Ms. on file at the Carnegie Museum, Pittsburgh.

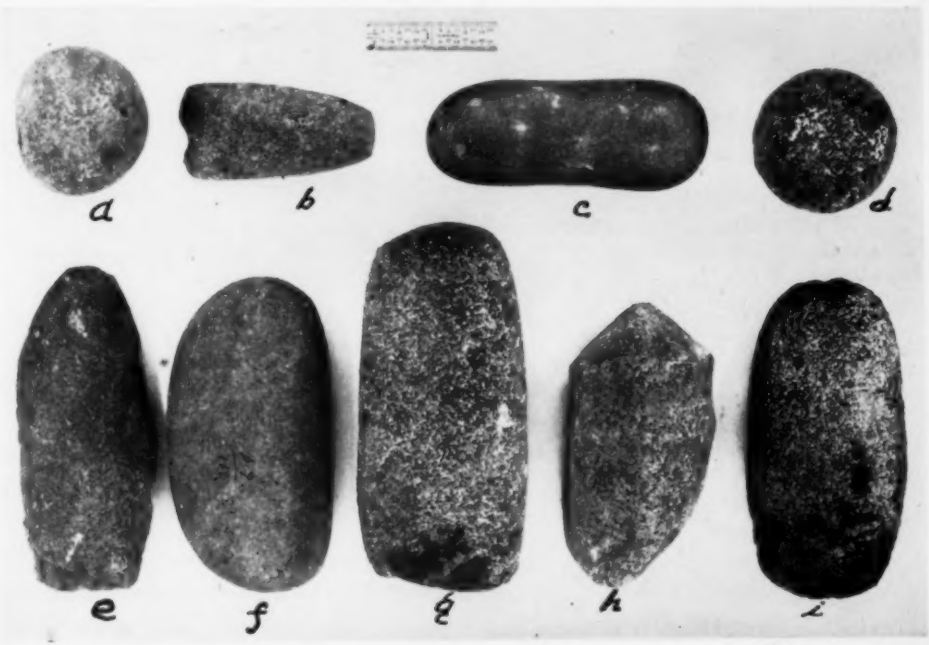

FIG. 111. Artifacts, McKees Rocks Mound.

CRALL MOUND

On a sheltered terrace overlooking Pigeon Run and just west of its junction with the Monongahela River, in Carroll township, Washington county, stood a conical mound, 60 feet in diameter and 9 feet high, that was partially explored in 1886 by Mr. Charles M. Smith, for the Smithsonian Institution.[18] Excavations were made by running a trench 6 feet wide and 35 feet long in from the eastern edge and intersecting this with a second trench from the southwestern side. A thin stratum of charcoal and burnt earth, encountered 17 feet from the point of beginning and between 3-4 feet above the original surface, continued westward for 12 feet with an upward slope nearly corresponding to that of the surface of the tumulus. Underlying the bottom of the mound was a layer of tough gray clay, varying in thickness, and above this a central core with successive deposits of different sorts of earth formed the mound structure. The excavations disclosed chalcedony flakes and chips from the Flint Ridge quarries in Ohio, presumably loose in the mound fill, and 7 burials.

[18] Thomas, 1894, pp. 494-496; and Charles M. Smith, letters to Cyrus Thomas, June-November, 1886, Bureau of American Ethnology archives.

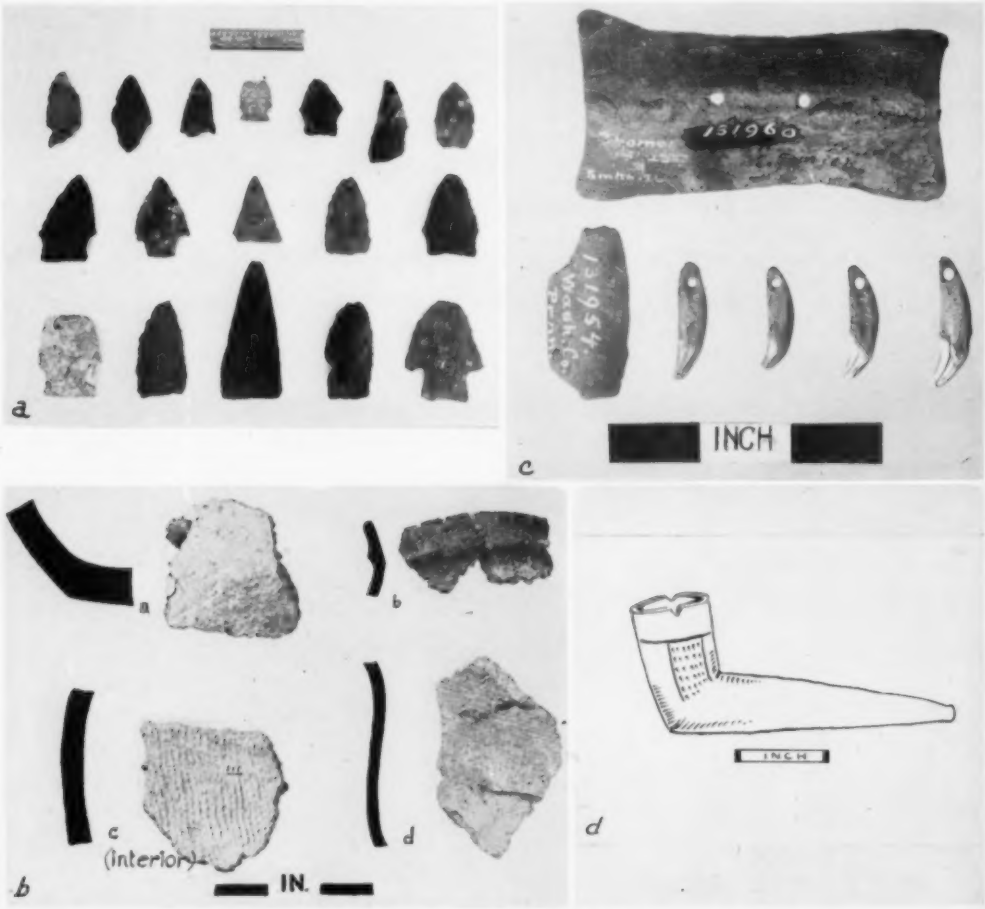

FIG. 112. Artifacts, various sites.

Burial 1: At the center of the mound the stratum of gray clay lay unbroken over a hole (3′ across the top, 2′ across the bottom and sunk 2′ into the original soil) containing the poorly preserved fragments of an adult skeleton.

Burial 2: Portions of another adult skeleton rested on the layer of clay, directly over the first grave. A fragment of soft, earthenware pipe or tube (Fig. 112, *c*) occurred with the burial.

Burial 3: About 5′ southwest of and on the same level as the above, were a few fragments of bone; a copper gorget (Fig. 112, *c*); fragments of a badly decomposed, finely laminated limestone gorget (?) showing a high polish on portions protected by the copper; and pieces of thin copper plate, one of which preserved some "kind of fur." The copper gorget, to which adhered "something like wood" and small fragments of leather or buckskin string, had been doubled over along its long axis and hammered flat, suggesting intentional mutilation. The bones and artifacts plus traces of charcoal and woody fiber, extending over a space 2′ across, lay flat upon the gray clay, and suggested to Smith that the skeleton had either been wrapped in, or covered by, the fibrous inner bark of the basswood or a similar tree.

Burial 4: Merely the fragments of a skull and bones, lying 4′ west of center and 1′ above the mound base. Burials 1 through 4 were thought to be either flexed or bundle burials, probably the former.

Burial 5: Regarded by the excavator as intrusive merely because of its position in the mound, consisted of a few pieces of bone and tooth worn down to the socket, lying over the center of the mound 5′ from the bottom, and the fragments of a femur, 4′ west of, and with its axis toward, the tooth. By the femur lay a small chalcedony knife.

Burial 6: The leg bones of an extended skeleton, headed east, lay about 3′ above the mound base and 6′ southwest of center.

Burial 7: Lay close to the surface, 20′ southwest of center. Other skeletons had previously been found near this burial by the workmen of Mr. I. S. Crall, owner of the property on which the mound stood.

In the same field, northeast of the first tumulus, stood a small mound which was removed prior to Smith's excavations. Several skeletons and a pipe, said to be of quartz or calcite, were uncovered. A nearby village site has since been nearly or totally destroyed.[19]

[19] Field notes of George S. Fisher, on file at the Pennsylvania Historical and Museum Commission, Harrisburg.

In a recent study, Webb and Snow (1945, pp. 58-9, 101) interpreted the band of charcoal and burned layer found here as an indication that the mound had been built on the floor of a standing house and over a central burial pit, then the house burned and finally the mound enlarged. On this evidence plus the presence of a copper gorget, the Crall Mound was classified as Adena. If we accept at face value the meager traits at hand, this would appear to be a reasonable suggestion.

MAPLETON MOUND

A fair-sized earth mound, located about 50 feet above the present valley and on a former plain of the left bank of the Monongahela River near Mapleton, Greene county, was the subject of brief investigations carried on in 1919 by Dr. William C. Farabee (1919, pp. 166-7) for the University Museum, Philadelphia. Superficial exploration of the tumulus, originally said to have stood about 5½ feet high and 40 feet in diameter, revealed two burials, both loosely flexed on their backs and badly decomposed. The first lay near the periphery on the original surface, while the second burial was uncovered midway up near the mound center. Not even a flint chip was observed.

MAHONING RIVER MOUND

Still another mound is known to have stood on the second bench of the Mahoning River's west bank, about a quarter of a mile back from the water. Reaching a center height of 5 feet, the tumulus was gridiron in shape with a diameter of 35 feet and a southwestern projection of equal height and length. Leveling the mound years ago exposed a number of skeletons in cists of large stone slabs set on edge, accompanied by "a few implements, bone beads, mica, etc." It was noted that the mound fill differed from the surrounding earth and contained flint chips and arrowheads (Taylor, 1878, pp. 306-7).

SHEPPLER MOUND

Engberg (1930, p. 72) reports the exploration in 1929 of a conical earth mound on the Sheppler farm in Westmoreland county, three miles east of Belle Vernon. In addition to one burial, unaccompanied by mortuary offerings,

grit-tempered pottery occurred "that was radically different from that found on any of the sites (Monongahela Woodland) investigated during the summer."

MONONGAHELA CAIRNS

Charles M. Smith of the Smithsonian Institution, probably the first and only archaeologist to investigate these numerous cairns, carried on limited research along both banks of the Monongahela in 1886. A detailed summary of his observations, with minor modifications, can be found in Thomas (1894, pp. 496-9). At first Smith was greatly impressed by the large number of cairns and stone-earth mounds in the region, particularly around Monongahela City and Belle Vernon, but this enthusiasm was short-lived, for it was soon found that hardly a mound had escaped earlier exploration and all were almost totally sterile. Although the tumuli varied in size and construction, they were generally small, composed mainly of stone and located in groups on river bluffs. Thomas (1894, Fig. 327) shows one group of cairns placed on a raised elliptical platform of earth, but no later investigations have been made to confirm or deny this reconstruction.

CHEAT RIVER CAIRNS

A more revealing account is to be found in Hayden's description of the exploration in 1896-1898 of 8 cairns in a wild and unfrequented region just north of the West Virginia border. Excavations were begun by first opening a group of 3 cairns situated on the apex of a steep bluff some 300 feet above the Cheat River near the Upper Dewing Boom, Fayette county. Two of the cairns lay so close together that they overlapped and merged into one, 20 feet long, 12 feet wide, and 3 feet high at the two vertices. Beneath the center of each lay a fragmentary burial; the first, with potsherds, a few inches below the surface of the ground; and the second grave 17 inches deep with both sides and ends lined with flat stones standing on edge and accompanied by two triangular arrowpoints, several flint chips, "a long flat stone beveled on the edges probably used as a gorget," and a few potsherds. The third cairn lay about 50 feet distant and contained a crushed skeleton, with skull and pelvic bone fragments intermixed, lying in a grave 16 by 30 inches and scooped out to a depth of about 6 feet. Around the base of a skull occurred about 50 polished bone heads and an equal number just above the ankles (Hayden, 1911, pp. 99-101; 1941).

Next investigated was a group of 3 disturbed cairns standing on the farm of a Mr. Costello on the second rise of a high hill about 300 feet above the Cheat River. Two of the tumuli, one with bone fragments, resembled those previously described, while the third was composed of much larger boulders and covered, in addition to a small "game ball of calcite," a pair of crushed skeletons, both with their respective skull and pelvic fragments intermingled and the tibiae and femora lying side by side near the skulls.

On top of this same hill, some 800 feet above the river, 2 more cairns, both standing on exposed sand rock, were opened. Beneath the first appeared crushed bones and a well-fashioned pipe of clay, "with a sprinkling of iron ore in its natural state in it" (Fig. 112, *d*). The bowl was 2¼ inches high and 1½ inches across, while the stem tapered from ¾ to ⅜ inches. In the other cairn an arrowhead was found, together with 2 well-preserved but crushed skeletons.

POLLOCK'S HILL CAIRN

The best available description of a cairn in the Monongahela region is Cadzow's (1933) detailed account of excavations by George S. Fisher in 1932 on the George Bentley farm, 3½ miles east of Finleyville, Union township, Washington county. From its position on the crest of Pollock's Hill, an elevation extending out on a bend in the Monongahela River, the cairn overlooked the town of Elrama and the countryside below. It consisted of a circle approximately 42 feet in diameter with stone slabs of varying sizes arranged so as to lean toward the center, except on the northwest side, where for a space of 12 feet they leaned outward. On at least two prior occasions the tumulus was the object of investigation by looters who removed the center section and left the cairn in such a highly disturbed state that only a generalized description can be given.

Forty-nine flexed and extended skeletons, the majority lying crushed between rock layers in groups of from 2 to 9, are purported to

have been found. It is interesting to note that nearly all of the groups were characterized by having the burials within them oriented in the same direction and lying in the same position. Some of the bones of certain extended burials were allegedly calcined. An interesting platform some 8-10 inches thick, 12 feet wide and of undetermined length, lying on the floor in the northwest section, is reported to have been carefully shaped from foreign clay. Two flexed burials and an ash layer, 5 feet by 40 inches in area and 4 inches thick, lay directly on top of the clay platform. On the extreme southeast side, near the edge, occurred an ash deposit 16 inches in diameter, 3 feet deep and covered by a large flat stone. The following specimens, now in the possession of the State Museum, Harrisburg, were obtained: 2 rectangular celts, a stone mortar, a corner-notched and a side-notched and 3 stemmed points, 2 perforated canine teeth of bear, 2 bone fishhooks without knobs or barbs, and 2 rolled copper beads ¼ inch in length. Of these, possibly one of the celts and a copper bead, both bear teeth, and, though doubtful, the mortar, may have been directly associated with certain of the burials.

STONE GRAVES

One of the most baffling riddles in Pennsylvania prehistory relates to the reported occurrence in this southwestern area of whole cemeteries of stone-covered and often stone-lined burial vaults, apparently unrelated to artificial mounds. Small of size, the vaults long excited the curiosity of all observers. Although actually a large number of the graves appear to have been either those of children or bundle burials, the early settlers both here and elsewhere had quite a different interpretation; they were the remains of a race of dwarfs. Both Smith (Thomas, 1894) and Farabee (1919) opened a number of these stone graves, and while Smith found only five perforated canine teeth (Fig. 112, c), Farabee obtained utterly nothing and could only repeat the statements of farmers who alleged finding shell beads and copper pendants. Stone-covered graves opened by Engberg (1930, pp. 75-85), appear to belong to the Monongahela aspect and may be unrelated to these large cemeteries.

REMARKS

Detailed analysis of the tumuli of southwestern Pennsylvania cannot fail to impress one with two outstanding facts. On the one hand there is a certain homogeneity of components. Mounds are frequently large and of simple construction; there is a relative scarcity —and sometimes total absence—of mortuary offerings; artifacts from the graves and probable contemporaneous specimens from the mound fill are frequently quite similar to those found among culture groups known to be early in other areas; cremations are both extremely rare and apparently late; and stone cists, as at McKees Rocks and Darlington, occur only in the upper and presumably late stages of construction of certain of the mounds. This last item may prove to be of the very first consequence in future attempts to work out the relative chronological position and cultural identification of these imperfectly known sites, the artifacts and mortuary customs of which suggest placement within the Adena-Hopewell period.

On the other hand, one would err to consider all of the tumuli in this southwest area as a cultural unit or, at least, as the product of a specific tradition. Thus, while all of these tumuli may well be related, certain sub-groups are indubitably distinct, and this differentiation is of moment.

Of the cairns, little can be said other than that they most certainly relate to that widespread group of low-lying slab mounds which with reasonable variation in construction are "distributed from the region of Pittsburgh down the Ohio as far as Louisville, and up the tributaries of the Ohio between these points for fifty miles on both sides of the river. They are also found in the valley of the Kanawha River as far as Charleston, West Virginia, and are unusually numerous for fifteen miles on either side of Maysville, Kentucky, on the bluffs on both sides of the Ohio" (Lilly, 1937, p. 62). They are quite different from, and should not be confused with, the boulder mounds found near Spartansburg, Pennsylvania, and the stone-lined graves so common in the Monongahela country. From the very nature of the tumuli and the defectiveness of existing records, it is impossible to do more than suggest that in some imperfectly understood way the cairns probably relate to an as yet undefined phase of the Adena complex.

Identifications of the Crall Mound as Adena, first by Greenman (1932, p. 521) and later by Webb and Snow (1945, pp. 58-9, 101), can hardly be challenged, although it should be noted that the copper gorget (Fig. 112, *c*) is not, as previously considered, a true "reel." Personally, I find it difficult to accept any hypothetical mound reconstruction based on vague soil features here, but there are no grounds for dogmatic assertions either way. The close proximity of such large and famous Adena components as Grave Creek and Beech Bottom (Bache and Satterthwaite, 1930) make probable the existence of this culture in the area, but whether the Crall Mound constitutes sufficient evidence to confirm this, remains open to question.

And finally, though classification of the McKees Rocks Mound may be premature, I cautiously suggest that the differentiation between Adena and Hopewell, particularly in peripheral areas, is not nearly so great as a comparison of their focal centers indicates and, assuming that the roots of the Adena complex go back further in time than do those of the Hopewell culture, that we have here a very early Hopewellian site with residual vestiges of the older manifestation.

But though these variations are readily apparent, the more striking feature is certainly similarity. In the last analysis Adena and Hopewell were primarily religious complexes that probably cut across linguistic and political boundaries. Here we have dealt with peripheral sites lacking the more spectacular religious phases.

BIBLIOGRAPHY

Anonymous

1810. "Extract from a Manuscript Journal of a Gentleman Belonging to the Army, While under the Command of Major General St. Clair." *Collection of the Massachusetts Historical Society for the Year 1794*, Vol. 3. Boston.

Ashe, Thomas

1811. *Travels in America*. London.

Bache, Charles and Linton Satterthwaite, Jr.

1930. "The Excavation of an Indian Mound at Beech Bottom, West Virginia." University of Pennsylvania, *The Museum Journal*, Vol. 21. Philadelphia.

Cadzow, Donald A.

1933. "Mr. George S. Fisher's Discoveries in Western Pennsylvania." *The Pennsylvania Archaeologist*, Vol. 3, No. 3. Harrisburg.

Engberg, Robert M.

1930. "Archaeological Report." *Western Pennsylvania Historical Magazine*, Vol. 13, No. 2. Pittsburgh.

Farabee, William C.

1919. "Indian Children's Burial Place in Western Pennsylvania." University of Pennsylvania, *The Museum Journal*, Vol. 10, No. 3. Philadelphia.

Greenman, Emerson F.

1932. "Excavation of the Coon Mound and Analysis of the Adena Culture." *Ohio Archaeological and Historical Quarterly*, Vol. 41, No. 3. Columbus.

Hayden, Harry

1911. "Tumuli Along the Cheat River." *The Archaeological Bulletin, Quarterly Publication of the International Society of Archaeologists*, Vol. 2, No. 4. College Corner, Ohio.

1941. "Tumuli Burials Along Cheat River." *The Pennsylvania Archaeologist*, Vol. 11, No. 1. Milton.

Lilly, Eli

1937. *Prehistoric Antiquities of Indiana*. Indiana Historical Society. Indianapolis.

Taylor, William N.

1878. "Ancient Mound in Western Pennsylvania." *Annual Report for 1877, Smithsonian Institution*. Washington.

Thomas, Cyrus

1894. "Report on the Mound Exploration of the Bureau of Ethnology." *Twelfth Annual Report, Bureau of Ethnology*. Washington.

Webb, William S. and Charles E. Snow

1945. "The Adena People." *University of Kentucky Reports in Anthropology*, Vol. 6. Lexington.

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ROBERT HAYWARD BARLOW — 1918-1951

With the passing of Robert H. Barlow, Middle American researchers lose a dear friend, a thorough scholar, and a congenial co-worker. Born in Leavenworth, Kansas, May 18, 1918, at a time when his father, Col. B. L. Barlow, was serving with the American forces in France, he received training at the Kansas City Art Institute and subsequently at San Francisco Junior College. He went to Mexico in 1940-41, studied at the Escuela Nacional de Ciencias Biologicas, and upon his return to California received the B.A. degree at the University of California in 1942. Returning to Mexico as a permanent resident, he joined the staff of the Universidad Nacional Autonima de Mexico and subsequently became head of the Department of Anthropology at Mexico City College, which position he held at the time of his passing on January 2, 1951.

For Bob Barlow to become a scholar of stature was inevitable. He arrived in Mexico as a student, laden with plans, problems, and a pent-up ambition to delve into the complex problems of Mexican antiquities. Indicative of his unbounded energy and planning was his card index of all glyphs in the Mexican codices. At the same time he cooperated with Prof. Salvador Mateos Higuera in a descriptive survey of Mexican codices. Within a brief three years he had cooperated with Mr. George T. Smisor to plan and edit "Tlalocan," a journal of source materials on native cultures of Mexico. Beginning in 1943 with the appearance of "Tlalocan," his productivity attained added momentum and his articles appeared with increasing frequency in the scholarly journals of Mexico, United States, and Europe.

Many were the facets of his friendly character, many were the scholarly attributes of his research. Concern for minutia led to such works of detail as "The 18th Century *Relaciones Geograficas*." With the zeal of a Zelia Nuttall he searched for and deciphered little known or dimly recalled codices and colonial manuscripts. He combined his zeal for search, his concern for detail, and his inexhaustible capacity for work by surveying and evaluating Mexican source material with the care and caution of a skilled detective. He published the results of his survey with acumen and insight. This task brought him to many important libraries or archives and earned him such honors as a Rockefeller Foundation Fellowship in 1944 and a Guggenheim Fellowship 1946-48.

Robert's enthusiasm and buoyancy won him friends wherever he traveled. Unselfishly he encouraged his colleagues and sponsored their publications. In this endeavor he was motivated by a genuine interest in the research of others and an enduring concern to make the many rare and unpublished documents available to all. Also testimony of his cooperative efforts is the long list of articles which he co-authored with his colleagues in colonial history, linguistics, codices, and archaeology.

In the brief span of a decade Barlow gave Middle American research an impetus and perspective of enduring consequence. His contributions in Mexican archaeology, classical and modern Nahuatl, Mexican colonial history, and what he preferred to call "Bilderhandschriften" are of lasting importance.

—Charles E. Dibble

FACTS AND COMMENTS

THE BALL GAME PLAYED BY THE ABORIGINES OF THE ANTILLES

The study of the so-called *juegos o corrales de los indios* comprises one of the most interesting aspects of West Indian archaeology. The Archaeological Research Center of the University of Puerto Rico has devoted special attention to their study in the belief that these *juegos* stand in intimate relation with a number of problems of Caribbean archaeology, the solution of which cannot but lead to a clearer and more exact view of the aboriginal culture.

The earliest historical notices of these sites are to be found in the chronicles of the conquest and colonization. We learn that one or more courts, in which games of ball were played and ceremonies with a socio-religious significance were celebrated, were to be found in each village. Bartolomé de las Casas (1909) describes the courts in these words:

> . . . tenían una plaza, comunmente ante la puerta de la casa del señor, muy barrida, tres veces más luenga que ancha, cercada de unos lomillos de un palmo o dos de alto . . .

The aboriginal name for the court and the game was *batey* (Casas, 1909). The same word is used by the country people of the Antilles today to refer to the small open areas in front of their houses. The chronicler Oviedo (1851) describes the balls which were used in the game:

> E las pelotas son de unas rayces de árboles e de hiervas e zumos e mezcla de cosas, que toda junta esta mixtura parece algo cerapez negra. Juntas estas y otras materias, cuencenlo todo y hacen una pasta; e rodeanla y hacen la pelota, tamaño como una de las de viento en España, e mayores e menores; la cual mixtura hace una tez negra, e no pega a las manos; e después que esta exuta tornase algo espongiosa, no por que tenga agujero ni vacuo alguno, como la esponga, pero aligerescesse; y es como fofa y algo pesada.

This description of Oviedo's of the balls which were used in the game leads us to the conclusion that they were made of rubber or of some resin with similar properties. We see here, therefore, the first allusion in history to rubber and to its use by the Indians of the Antilles.

The game was played by two teams or sides, each of which was made up of from ten to thirty players. As a rule the teams were composed of men exclusively, but on some occasions women as well participated in the game (Casas, 1909). Oviedo (1851) notes a certain resemblance between the game played in the Antilles and the game of football which he had seen played in Italy. Bartolomé de las Casas (1909) describes the game itself as follows:

> Echaba uno de los de un puesto la pelota a los del otro y rebatíala el que se hallaba mas a mano, si la pelota venía por alto con el hombro, que la hacía volver como un rayo, y cuando venía junto al suelo, de presto, poniendo la mano derecha en tierra, dabale con la punta de la nalga, que volvía mas que de paso, los del puesto contrario, de la misma manera la tornaban con las nalgas, hasta que, segun las reglas de aquel juego, el uno o el otro puesto cometían falta.

Faltas or errors in the game consisted in allowing the ball to come halt on the ground, or throwing it beyond the limits of the court. The ball could only be struck with the shoulder, the elbow, the head, the hips or the knees and never with the hands. Oviedo (1851) explains very clearly why the ball could not be struck with the hand:

> Estas pelotas saltan mucho . . . mas como son macizas son algo pesadas; e si le diesen con la mano abierta, o con el puño cerrado, en pocos golpes abrirían la mano o lo desconcertarían.

Bartolomé de las Casas (1909) tells us that when women played the game among themselves they did not use their hips or their shoulders, but rather struck back the ball with their knees.

The historical sources make it clear that the game was of great importance among the aborigines and served as a social bond among the different communities of indigenous population. Matches were held between town and town at which wagers were made and the caciques offered prizes. In the history of the conquest of Puerto Rico there is an interesting incident connected with the game. The chroniclers relate that at the commencement of the native rebellion the cacique Aymamon laid hold of a young Spaniard and offered him as a prize or trophy to winner of a match. But for the prompt intervention of Diego de Salazar, a Spanish captain, Oviedo (1851, libro 16, cap. 4) says the life of the young man would indeed have been the prize of the winner. Oviedo (1851, libro 16, cap. 5) also tells us that the fate of Don Cristobal de Sotomayor was decided by a game of ball. These allusions, and the archaeological discoveries associated with the courts where the game was played, lead us to believe that the game was more than a diversion and had a ceremonial and religious significance. This ceremonial and religious significance, taken together with the other features of the game which have been referred to, appears to indicate a certain connection with the Mexican *tlachtli* and the *pok ta pok* of the Mayas. Although it is true that in the game as played in the Antilles there is no reference to rings through which the ball was passed, it is known that in the Mexican game the passing of the ball through the stone ring occurred very seldom, there being another method of scoring. We are of the opinion that the *batey* of the Antilles is a simplified version, adapted to the cultural level of the *tainos* of the Mayan *pok ta pok*. It is certain that a simplified version of the Mexican *tlachtli* was played by the Indians of the Hohokam culture, in the Southwest of North America. It is possible that the route of diffusion of the game of *pok ta pok* and of other elements of Mayan culture was not a direct one from Yucatan to the Antilles, but an indirect one by way of South America, for we know that in South America a similar game was played by the Otomacos (Gumilla, 1944).

At the time of the disintegration of the aboriginal culture of the Antilles the game of *batey* ceased to be played. In Puerto Rico at the present time there re-

mains only a vague recollection in the oral tradition of the country people of the center of the island, where the courts in which it was played are still recognized and are referred to as *juegos o corrales de los indios*. Almost all the courts are found in the interior of the island. This pattern of distribution presents us with a difficult problem, for we know that during the historical period it was in the coastal belt that the most important Indian settlements were situated. The explanation may lie in the fact that on the coast the system of agriculture practiced, especially the cultivation of sugar cane, has been so intense as to destroy all traces of the courts, which were simple structures, while in the interior of the island, owing to the character of the terrain, the soil has not been as intensively cultivated as to lead to such result. The courts which have been discovered in Puerto Rico lie in the environs of Utuado, Lares, Adjuntas, Barranquitas, Orocovis, and Jayuya. All of the aforementioned townships are situated in the mountainous region in the center of the island. The courts are as a rule encountered close to rivers and in narrow valleys.

The Center of Archaeological Research of the University of Pueto Rico established a field-base in the region of Utuado for the purpose of studying the remains of those courts of which all traces have not been obliterated by the continuous cultivation of the soil. In this region it was possible to verify the existence of twenty-four courts. Size and state of preservation vary considerably. All were carefully studied and excavations were carried out at the sites of the most important of them, in the course of which a quantity of fragments of earthenware and several stone utensils were found. The artifacts discovered belong to the *taino* phase of the Arawak culture and were found for the most part in the environs of the courts, but, in a few cases, in the courts themselves. In only one case were graves (three) encountered in the environs of a court.

Of all the courts which were studied the most important are to be found on the property of Sr. Manuel Díaz-Mas, in the Barrio Caguanas of Utuado. To all appearances on this property was situated the most important center of the aboriginal religion yet discovered in the whole area of the Antilles. Here, besides a great central court, are eight other rectangular courts of various sizes and one circular court. The importance of the remains on this property was pointed out more than thirty years ago by the American archaeologist J. A. Mason, who initiated the excavation of the site (Mason, 1940).

The Center of Archaeological Research devoted four weeks to the excavation of the central court and the ground adjacent to it. This court is a rectangle 160 feet long and 120 feet wide. The longer sides, which run from north to south are marked by lines of great stone blocks or monoliths, some of which are more than six feet high and must weigh more than a ton. The manner in which these great stones have been planted vertically in the earth to form an enclosure of such a size is remarkable. If we consider their weight and the fact that it was necessary to bring them to their present position from a river-bed several hundred meters away, we may appreciate the importance and significance of this work of primitive engineering. The two shorter sides of the rectangle consist of two paths formed of smaller stones set in regular order. Many of the great stones of the two longer sides still show faint traces of the carvings which they once bore. Stone artifacts and fragments of ceramic ware were encountered in the ground adjacent to the court, where once stood the *bohios* or dwellings of the aborigines. In the same area were discovered a number of wooden posts which doubtless once formed part of the *bohios*. These posts are of a wood known to the country people of the island as *ortegón* (Coccoloba rugosa); some are of considerable size and appear to have been used in the construction of important wooden structures, possibly watchtowers or residences pertaining to the caciques. Their preservation is due to the nature of the soil, which is a clay, and to the durable quality of the wood.

The data and material obtained in the field are still under study; nevertheless, we feel justified in advancing certain general observations with regard to the importance and significance of the playing courts in the archaeology of the Antilles. We believe that we have discovered sufficient evidence to establish a connection between the courts and the so-called "stone collars" which are so characteristic a feature of Puerto Rican archaeology. These stone collars have hitherto constituted an enigma; a number of conflicting theories have been put forward to explain their significance or use. In the course of our excavations a number of fragments of collars were encountered, and according to the inhabitants of the district several complete specimens had previously been found in the environs of the courts and either destroyed in the belief that they might contain objects of value or sold to collectors. It appears to be significant that by far the majority of the collars the provenance of which is known, were found in the region in which the playing courts are situated. More than half of the specimens in the archaeological collections of Puerto Rico were found in the townships of Utuado and Orocovis, which comprise the region in which the playing courts are most common. What function these collars could have had in the game of ball is not immediately evident. However, the clear connection between the *batey* of the *Antilles* and the Mexican game calls to mind the interesting discovery made by Ekholm (1946) with regard to the possible use of the stone yokes of Central America in the ball game as there played. According to Ekholm the stone yokes were worn by the players as ceremonial belts. His thesis seems more probable since the discovery of terra cotta figurines representing players of the game wearing belts, which resemble the yokes. The enigmatical stone collars of Puerto Rico, whose resemblance to the yokes of Central America has been repeatedly pointed out (Fewkes, 1907), may have had a similar function.

FIG. 113. *a*. The longer sides of the plaza are marked by lines of great stone blocks or monoliths. *b*. The central and the circular plaza.

FIG. 114. *a*. Partial view of the central plaza. *b*. The shorter sides of the plaza consist of paths formed of smaller stones set in a regular order.

FIG. 115. In the ground adjacent to the court were discovered a number of wooden posts which doubtless once formed part of the *bohios* or dwellings.

The association of courts in the Barrio Caguanas of Utuado appears to indicate that the district was a religious center. Nowhere else have we discovered a grouping of courts of different sizes and shapes. This association of such a number of courts on one side can only be explained by the existence of elaborate socio-religious ceremonies in which the ball game played an important part. Although fragments of ceramic ware and some utensils were found in the environs of the courts, these finds were so scanty that they do not appear to indicate the existence on the site of a village of any great size.

The study of the playing courts has cast a new light on the subject of the archaeology of the Antilles and has shown beyond question that the cultural connections between the Antilles and Central America deserve further consideration and investigation.

BIBLIOGRAPHY

CASAS, BARTOLOME DE LAS
1909. *Apológetica historia de las Indias.* Por M. Serrano y Saenz. Nueva Biblioteca de Autores Espanoles, Vol. 13, p. 358. Madrid.

EKHOLM, GORDON F.
1946. "The Probable Use of Mexican Stone Yokes." *American Anthropologist*, Vol. 48, No. 4, pp. 593-606. Menasha.

FEWKES, JESSE W.
1907. "The Aborigines of Puerto Rico and Neighboring Islands." *Annual Report, Bureau of American Ethnology*, 1903-04, Vol. 25, p. 167. Washington.

GUMILLA, JOSEPH
1944. *El Orinoco ilustrado*, Vol. 7, Tomo 1, p. 165. Bogotá.

MASON, JOHN A.
1941. "A Large Archaeological Site at Capa, Utuado." *New York Academy of Sciences, Publication of the Scientific Survey of Porto Rico and the Virgin Islands*, Vol. 18, Pt. 2. New York.

OVIEDO Y VALDES, GONZALO FERNANDEZ DE
1851. *Historia general y natural de las Indias, islas y tierra-firme del mar océano*, Vol. 1. Madrid.

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A SHELL SNAKE EFFIGY FROM BRITISH HONDURAS

During a field trip to British Honduras in the summer of 1950, the carved representation of a serpent sketched in Figure 116 was seen in the private collection of Mr. Eustace Evans of Belize. Esthetically, the piece is designed and executed with a skill that makes it an outstanding example of aboriginal art. The specimen is also deserving of description because it is stylistically unusual for the Maya area, being quite different from the traditional Maya artifacts.

The artifact, now in the possession of Mr. Evans, was found by workers digging a pit on the Evans plantation (Last Chance Plantation) which is on the west bank of the Salt Creek Lagoon, some twenty miles up the coast from Belize. The present writers visited the site of the find, which was a large area of aboriginal occupation. There are a number of low constructed mounds, with no discernible plan of arrangement. The whole area is covered with a midden deposit, including areas six feet or more in depth.

Lack of time prevented an adequate investigation of this site. Surface sherds show numerous local peculiarities but appear to be most similar to Thompson's San Jose V period (Thompson, 1939, pp. 138-51). Preliminary indications are that the occupation of the site extended into terminal Tepeu or later times. The position of the snake effigy within the site is not known, but the naturalistic treatment contrasts sharply with the highly conventionalized serpent form usually found in Maya art.

The shell snake is 5⅜ inches in length and about an inch in diameter. It is made from the columella of a large conch shell, and the surface of the specimen is smooth and ivory-like in color and texture. By using the natural twist of the shell the native artist has created an impression of writhing movement. The design is made by shallow incised lines; the eyes are shallow drilled pits (the ventral groove is natural). The workmanship varies in quality, more care being evidenced at the head end than at the tail.

There is nothing to indicate original use of the specimen. The groove around the tail end appears to be the only means of attachment. There are no worn surfaces, and the object was most likely not of a utilitarian nature. The more elaborate upper surface suggests that the artist intended the snake to be viewed from the top.

In making a stylistic comparison of this snake effigy with other remains, two elements of the design may possibly have distributional significance. These are the treatment of the eye and the decoration of intertwined bands along the sides. Both of these elements are simple, but neither appears to be of common occurrence in Maya art.

The way in which the eye of this serpent is represented is, to our knowledge, unique for the Yucatan region. The lines extending away from the eyes are distinctly not in the tradition of Classic Maya design, and the only similar eye treatment noted is on a Thin Orange whistling pot from Mitla (Kidder, Jennings and Shook, 1946, Fig. 197, *d*). The eyes of the shell effigy suggest the weeping eye motif prominent on shell artifacts of the southeastern United States, although details of the motif are not identical.

The intertwined bands which decorate the sides of the shell effigy are of more frequent occurrence in Middle America. Three examples of the motif used for the body of serpents have been noted. None is closely similar to the shell specimen, and all are Mexican rather than Mayan (Spinden, 1933, Figs. 6, 7, Tajin; Noguera, 1945, Pl. 7, Fig. 1B, Mixtec?; Hendrichs, 1943, Fig. 4, Tecpan, Gro). Intertwined bands were widely used as a purely geometric design, but their occurrence emphasizes a lack of temporal or areal significance at present (Anderson and Cook, 1944, Fig. 4, *e*, Tzakol, British Honduras; Thompson, E. H., 1895, Pl. VII, Fig. 1, *j*, Loltun Cave, Yucatan; Drucker, 1943, Pl. 41, *cc-ee*, San Marcos, Veracruz; Ekholm, 1944, Fig. 27, *k*, Tancol, Veracruz).

It is hoped that future work in British Honduras will yield more evidence on the origin and cultural affiliation of this unusual shell artifact. Present information suggests a late period and a possible foreign origin.

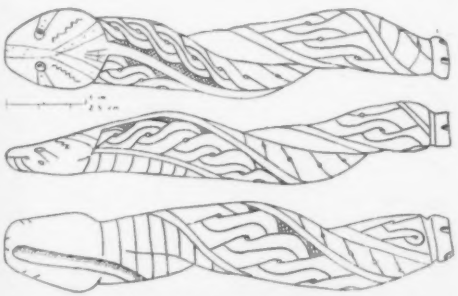

FIG. 116. Shell Serpent.

BIBLIOGRAPHY

ANDERSON, A. H., AND H. J. COOK
1944. "Archaeological Finds near Douglas, British Honduras." *Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*, No. 40, pp. 83-92. Cambridge.

DRUCKER, P.
1943. "Ceramic Sequences at Tres Zapotes, Veracruz, Mexico." *Bureau of American Ethnology, Bulletin* 140. Washington.

EKHOLM, G. F.
1944. "Excavations at Tampico and Panuco in the Huasteca, Mexico." *American Museum of Natural History, Anthropological Papers*, Vol. 38, No. 5. New York.

HENDRICHS, P. R.
1943. "Tlachtemalcates y otros monumentos de la zona arqueologica de la Soledad, Gro." *El Mexico Antiguo*, Vol. 6, pp. 120-30). Mexico.

KIDDER, A. V., J. D. JENNINGS AND E. M. SHOOK
1946. "Excavations at Kaminaljuyu, Guatemala." *Carnegie Institution of Washington, Publication*, No. 561. Washington.

NOGUERA, E.
1945. "El atlatl o tiradera." *Anales Museo Nacional de Archeologica, Historia, e Etnografia*, Vol. 28 (Series 5, Vol. 3) pp. 205-38. Mexico.

SPINDEN, E. S.
1933. "The Place of Tajin in Totonac Archaeology." *American Anthropologist*, n.s., Vol. 35, pp. 225-70. Menasha.

THOMPSON, E. H.
1895. "Cave of Loltun, Yucatan." *Peabody Museum of Harvard University, Memoir* 1, pp. 51-70. Cambridge.

THOMPSON, J. E.
1939. "Excavations at San Jose, British Honduras." *Carnegie Institution of Washington, Publication*, No. 506. Washington.

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PERUVIAN HORIZON STYLES

Rowe (1950) in his review of *Andean Culture History* by W. C. Bennett and J. B. Bird, 1949, makes certain critical observations on the use of the horizon style concept as a unifying device in the reconstruction of Peru-Bolivian prehistory. Not only Bennett but Kroeber (1944) and I (Willey, 1948) are included in these analytical criticisms. As this is a subject of general importance to Andean archaeology, and in view of my stand on it, I would like to call attention to some of my previously expressed ideas.

In speaking of the Paracas Cavernas culture of the south coast of Peru (or of the assemblage of grave artifacts upon which this culture and period have been predicated) Rowe (1950, p. 171) states that Bennett and I have confused both the Chavin and the Negative Painting horizons by indicating that they are present in this single Paracas period. Replying for myself, I quote the article of mine (Willey, 1948, p. 10) in question concerning the Chavin horizon in southern Peru:

> On the south coast and in the south highlands Chavin stylistic influence is much less definite. Possible connections have been pointed out with the Paracas Cavernas, Chiripa, Pucara, Chana-

pata, and Early Tiahuanaco periods. None of these southern styles shows as clearly, however, the identities with the Chavin technical or decorative elements that are seen in the other period manifestations.

Further, I was at pains to point out within Paracas Cavernas the apparent discrepancy of the association of Negative and supposedly Chavin horizon elements. This discrepancy I resolved, and at present writing would still resolve, by placing Paracas Cavernas as contemporaneous with the White-on-red and Negative horizons, not with Chavin (Willey, 1948, p. 11 and chronology chart, p. 9).

Another point which Rowe made has greater theoretical implications. In discussing the absence, or near absence, of the Chavin style feline design in southern Peru, he suggests (1950, p. 171) that a redefinition of the horizon, "on a basis of the association of incised designs with certain other technological characteristics of the pottery," might be applicable to the south. Such an "Incised Horizon" would, as Rowe demonstrates, run into the difficulties of being applicable to Argentine Barreales (to name only one of several) as well and would embrace materials of such chronological latitudes as to make the concept worthless as a time indicator. I most heartily agree with this, for it is an illustration of an argument which I advanced some years ago (Willey, 1945, pp. 53-4). Incision techniques, vessel forms and other technological features, and a feline representation, *per se*, do not add up to a manifestation of the Chavin horizon style, in spite of an insistence that they do (Carrion Cachot, 1948). Only the intricate and complex entity, the style itself (for Chavin, a rendering of the feline in a very special way within the confines of certain forms and certain techniques), has validity as a marker for cross-sequence chronological equations.

The horizon style concept has been of great value in Peruvian studies since Uhle's day. It presupposes a degree of cultural unity of the sort which Bennett (1948) has called the "co-tradition" or what can be called a culture area in depth. As Rowe properly argues, this unity should not be exaggerated, nor should the horizon style mechanism be loosely construed. As far as the Chavin horizon is concerned, I believe that the record will bear out the fact that I have always been a "strict constructionist" in this regard.

BIBLIOGRAPHY

Bennett, W. C.
1948. "The Peruvian Co-Tradition." *American Antiquity*, Vol. 13, No. 4, Pt. 2, pp. 1-7. Menasha.

Bennett, W. C., and J. B. Bird
1949. "Andean Culture History." *American Museum of Natural History, Handbook*, No. 15. New York.

Carrion Cachot, R.
1948. "La Cultura Chavin. Dos Nuevas Colonias: Kuntur Wasi y Ancon." *Revista del Museo Nacional de Antropologia y Arqueologia*, Vol. 2, No. 1, pp. 99-174. Lima.

Kroeber, A. L.
1944. "Archaeology in Peru in 1942." *Viking Fund Publications in Anthropology*, No. 4. New York.

Rowe, J. H.
1950. Review of "Andean Culture History." *American Antiquity*, Vol. 16, No. 2, pp. 170-2. Salt Lake City.

Willey, G. R.
1945. "Horizon Styles and Pottery Traditions in Peruvian Archaeology." *American Antiquity*, Vol. 11, No. 1, pp. 49-56. Menasha.

1948. "Functional Analysis of 'Horizon Styles' in Peruvian Archaeology." *American Antiquity*, Vol. 13, No. 4, pp. 8-15. Menasha.

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SOUTH AMERICAN-ARCHAIC RELATIONS: ADDITIONAL COMMENT

In a recent note Baerreis (1950) has given critical amplification to the question of possible cultural relations between the southeastern United States Archaic and the archaeologically known culture, or cultures, of the lower Parana River, Argentina. A paper of my own (Willey, 1949), on which Baerreis centers his discussion, focused attention on the Caribbean area and the north of the South American continent, giving only brief mention to interesting southeastern resemblances which may be found along the Parana and in the Sambaquis of southern Brazil. I agree that Baerreis has strengthened the case for cultural connections over and beyond the casual comments which I or others have offered.

Although standing with Baerreis upon the importance of this Archaic-Parana River theme for future investigations, I take issue with his methodological critique. It is undeniable, as Baerreis argues, that the comparative method as an approach to problems of historical relationship is most effective when we deal with culture groups which are, or were, approximately coeval in time. Yet it is often difficult or impossible in the exploratory framing of the question of contemporaneity, near-contemporaneity, or non-contemporaneity. This is particularly true if geographical distance between the regions involved is great and if archaeological research in either region, or in intervening areas, is not well advanced. Baerreis (1950, p. 165), states with reference to my atttempts to compare the southeastern Archaic with the more or less modern (18th and 19th centuries) culture of the Marginal food-gathering tribes of Venezuela and Colombia:

> On the whole, however, it is unlikely that such a methodology can give valid conclusions as to historical relations *between* the two areas unless both culture types are on nearly the same time level. If we make a detailed comparison of the Marginal culture with the Southeastern Archaic, it must be principally on the basis of artifact types. Since the Marginal cultures of America, as defined in the *Handbook*, would have had several thousand additional years in which to develop and borrow a variety of new tool types, it is not surprising that the material culture in the two regions is rather distinct. The objection to this approach utilizing two distinct time levels would, of course, not be valid if the objective were to determine functional similarities rather than historical relations.

I do not think that time disparity here is necessarily the reason for cultural dissimilarity. An almost equally great time differential exists between the Parana River cultures, which Baerreis cites for comparisons and the

southeastern Archaic. Some of the archaeological sites of the Parana River which yield the thick, incised and linear-punctated pottery and the Archaic-like bone tool complex are known to belong to the historic contact period; others are pre-European but have sufficient typological resemblance to the later stations to imply that they were of the late prehistoric era. The Parana River cultures would have had the same "several thousand additional years," minus only three or four hundred, in which to borrow, to modify, and to change. Even if El Cerrillo (apparently one of the earliest of the lower Parana sites) and Tchefuncte (at the top of the southeastern Archaic column) are selected for special complex-to-complex comparisons, as Baerreis does, it is very doubtful if the chronological discrepancy has been eliminated. Assuming, though, that El Cerrillo and Louisiana Tchefuncte are exact contemporaries, the same dangers of separate borrowing and divergent change remain. In referring to El Cerrillo and Tchefuncte Baerreis (1950, p. 165) says

> In both instances we may have a survival from an earlier period when a single, or several Archaic complexes had diffused from one region to another.

Thus, in spite of a chronological equivalence, distinct and branching histories are, almost of necessity, implied for the hypothetical lower Mississippi Valley and lower Parana Valley offshoots of an ancient Archaic stock.

I do not believe it is methodologically unsound to expect some degree of trait survival in long distance cultural comparisons. If an ancient connection, such as Baerreis suggests, once existed between southeastern Archaic and lower Parana cultures, survival of traits, or trait complexes, was most probably involved. As to the methodological appropriateness of bracketing developmental-functional types of cultures together for the investigation of historical problems, this seems a justifiable beginning inasmuch as developmental-functional processes are not entirely unrelated to historical ones. In searching for historically and specifically related tool or artifact complexes, are we not most apt to find such relatedness among developmentally and functionally comparable cultures than among ones which are structured quite differently? The southeastern Archaic artifact similarities to the Marginal type cultures of the lower Parana bear this out as do the absences of such similarities in Andean or Tropical Forest culture type contexts.

BIBLIOGRAPHY

Baerreis, David A.
1950. "Comments on South American-Archaic Relations." *American Antiquity*, Vol. 16, No. 2, pp. 165-6. Salt Lake City.

Willey, Gordon R.
1949. "The Southeastern United States and South American: A Comparative Statement." *The Florida Indian and His Neighbors*, pp. 101-66. Winter Park.

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November, 1950

BONE GREASE

In the early literature, especially that relating to the prairies, there are numerous brief references to the extraction of oil or grease from bones by boiling. For instance, W. R. Gerard in his article on pemmican in Bulletin 30 of the Bureau of American Ethnology says: "Sweet pemmican is a superior kind of pemmican in which the fat used is obtained from marrow by boiling broken bones in water." Wissler in his paper on the *Material Culture of the Blackfoot Indians* says: "Marrow fat was obtained by boiling cracked bones and skimming the floating fat from the top of the kettle with a dipper made of horn." A still earlier reference to the same process is found in Schoolcraft's *History, Condition and Prospects of the Indian Tribes* (Vol. 4, p. 107) in which he says: "The men break bones, which are boiled in water to extract the marrow to be used for frying and for other culinary purposes. The oil is then poured into the bladder of the animal, which contains when filled about twelve pounds, being the yield of the marrow bones of two buffaloes."

In the summer of 1939 when doing archaeological work on the prairies, I was impressed by the enormous quantities of comminuted bones found in the neighborhood of old buffalo jumps and pounds. The bones had been broken up into very small pieces, and this had obviously been a regular practice rather than an occasional one.

In 1946 when doing anthropological work among the Loucheux people of Old Crow in the northern Yukon, I heard numerous references to the use of "bone grease" as a food. I was told that it was used much as we use butter, that it could be eaten alone when it was frozen hard, although it was very rich, and that it could be used for cooking. Some days later I happened to see, lying in a shallow pan, several handfuls of comminuted bone and asked one of my informants, Julia McDonald, about it. She answered that she had been making bone grease and described the process as follows:

> Bone grease (in Old Crow) is made from caribou and moose bones. After the meat has been cut off, the bones are left for one day, which allows them to dry a little. If the bones were left for two or three days, the bone grease made from them would taste too strong to be pleasant. A caribou skin from which the hair has been removed is laid on the ground and an anvil stone is placed in the middle of it. The bones to be broken are placed on the anvil stone and are smashed into little pieces, "as big as finger nails," with the back of an axe. In the old days stone hammers were used for this. The broken bones are then put in a kettle with a little cold water and placed on the fire. As soon as the water comes to a boil, cold water is added (snow in the winter time) so as to keep the water simmering rather than boiling violently. The purpose of this is to allow the oil and grease rendered out of the bone to float on the top, which it would not do if the water were boiling vigorously. The grease is skimmed off and put in a separate vessel, usually the small inner part of a caribou's stomach. Here it will keep quite well for as much as two or three years. Some of it was used for making the best grades of pemmican, for pemmican was made in this part of the Yukon, and some of it was kept for daily use in cooking.

Fish guts were used in the same way to make fish grease. When the process was completed, the grease was purified by re-heating and straining. This, too, was used for pemmican and, Julia added, it tasted of fish and was very greasy.

In 1947, when working on an archaeological site in southern Ontario, I again noticed large quantities of bones broken up into small fragments. After my experience in Old Crow it was easy to recognize them as the waste material left over from making "bone grease." It seems probable that this process was familiar to many of the aboriginal people who hunted big game.

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November, 1950

ANDEAN CULTURE HISTORY:
AN APOLOGY AND CLARIFICATION

Wendell C. Bennett was kind enough to call attention to an error in my recent review of his and Bird's *Andean Culture History* (*American Antiquity*, Vol. 16, No. 2, October, 1950, pp. 170-172) which I would like to correct. In discussing the spatial division of the Central Andes I tried to reconstruct the sequence of Bennett's ideas on the subject and made the assumption that order of publication reflected order of composition. This assumption is always dangerous and, in making it in this case, I overlooked the preface date of the work under review. The fact of the matter is that the manuscript of *Andean Culture History* was completed and submitted to the American Museum of Natural History before the Viking Fund symposium of July, 1947 was held. Hence, Bennett's contributions to the symposium volume (SAA-M No. 4, 1948) represent a later and not an earlier stage in the development of his ideas. Herewith my public apology for the misrepresentation.

To the symposium volume Bennett contributed two papers, one entitled "The Peruvian Co-Tradition" and the other "A Revised Sequence for the South Titicaca Basin." Both represent a somewhat different classification of the archaeological data than appears in *Andean Culture History*. The second paper, on the Titicaca sequence, is an excellent statement with which I am in entire agreement. The first, defining a Peruvian co-tradition, is a challenge to debate which no one has yet taken up. In it, the ideas of Peruvian cultural unity and cultural evolution developed by the interpreters of the Viru Project since 1946 are carried to their logical extreme. Naturally, my criticism in the review of a less extreme form of the same ideas applies even more strongly to the more extreme form. I thought, at the time I wrote the review, that Bennett had retreated from his extreme position; I now realize that he had not yet reached it.

It is worth recalling that changing interpretations in Peruvian archaeology (and probably all archaeology) are touched off less by the need to explain or classify new data than by the stimulation of ideas that have their background in the archaeologist's own cultural tradition and are not derived from the specimens. The fewer such ideas involved in a classification system the more flexible the system and the longer it is likely to continue in use. The original Uhle-Kroeber chronological scheme was flexible and durable because it involved remarkably few assumptions. When, in the 1948 symposium volume, Strong ridicules and rejects it, he does so in order to set up in its place a new type of classification full of assumptions about cultural process. The new system does not fit the "facts" any better than the old one, but it seems more satisfying if we feel the need to "explain" our data on the basis of assumptions of cultural process.

Similarly, Bennett's co-tradition paper involves a series of ideas which were not devised exclusively to fit the Peruvian data. Kroeber's general concept of the culture area as "a substantial unit of historical development" is the basic one. We can make the data of Peruvian archaeology fit the co-tradition framework somehow, if we wish; after all, no simple classificatory scheme represents the complexity of its material adequately. But in broader perspective, acceptance of the co-tradition idea implies acceptance of Kroeber's culture area concept and of a very considerable degree of order and direction (i.e., evolution) in culture history. On the other hand, rejection of the theoretical foundation of the co-tradition idea implies rejection of the culture area idea, if we are to remain consistent. I am not convinced that there is enough order and direction in cultural history to justify Kroeber's culture area concept in general and for any area; hence I am resistant to the whole idea of co-traditions.

Two quite different problems are involved in this discussion: one, how much over-all unity does the Central Andes display at different periods of its history? Two, is the culture area as defined by Kroeber an acceptable theoretical construct? Bennett assumes basic unity and accepts the culture area in both of his spatial classifications, but goes much further in the later one than in the earlier. I am inclined at present to take the opposite view on both problems, but I am happy that Bennett has stated a position that can be made the basis of constructive argument and I will try to be a better historian of his ideas.

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January, 1951

BOOK REVIEWS

Prehistoria de Mexico. Luis Aveleyra Arroyo de Anda. Prologos by W. Du Solier and Pablo Martinez Del Rio. Ediciones Mexicanas, Mexico D.F., 1950. 170 pp., 7 tables, 24 plates. $20 Mexican currency, $2.75 U.S.

This attractive little book is a timely, well organized, skilfully written, and valuable addition to the literature on the antiquity of man in America. No student of the subject can afford to be without it. The Spanish is clear and uncomplicated, and the plates include a number of artifacts and human remains which had become practically lost in obscurity.

The book was quite a revelation to me, for, like many archaeologists, I was inclined to accept de Terra's statement in connection with the Tepexpan discovery that up to 1947 human history in Mexico "began with the Archaic." It seems now that we had been merely ignorant of the number of previous discoveries which pointed to human remains in geological circumstances reaching back into Pleistocene times.

There are three principal sections of Sr. Aveleyra's book: first, a recapitulation of fossil human bones and primitive artifacts recorded in scientific literature between 1844 and 1946; second, a discussion of climatic and geological factors surrounding the skeleton found by de Terra at Tepexpan in 1947 (partly to "correct some erroneous beliefs about it"); and third, a general evaluation of the "industries" and artifact "complexes" of preceramic age recently described by de Terra in several publications.

The first pages are concerned with Aveleyra's distinction between "History" and "Prehistory" in Mesoamerica. "History" begins with the appearance of both pottery-making *and* agriculture in this province, since both appear to have entered Mesoamerica from somewhere farther south, full-blown and at about the same time. In a brief survey, Aveleyra shows that such linkage does not hold in such provinces as Peru, Southwestern United States, or the Eastern United States; hence, evidently, this definition is not meant for general application.

Chapter II reviews certain discoveries in Mexico and Guatemala which, by definition, belong to "Prehistory." Just as in the United States, there is a discouraging aura of vague description and uncertain position about each discovery; removal was done too hastily or without adequate notes; authorities offer conflicting interpretations of the manner of formation and age of the deposits, and so on. Yet, as Aveleyra points out, the accumulation of discoveries over the years greatly increases the probability that at least some of them are authentic. That is to say, even if the number of years cannot be guessed in any case (which Aveleyra wisely refrains from doing at any point), the probability increases that a human being or an artifact was actually associated with Pleistocene fauna or a deposit of approximately equivalent age. I feel that Aveleyra would rather have identified such discoveries as Pleistocene rather than "Prehistoric" if it had been possible, but the lack of specific data makes the latter term less controversial.

"El Hombre del Peñon" was discovered in 1844 by two geologists, near Mexico City, in a limestone deposit of hot-springs origin. The heavily fossilized bones were those of an adult lying on the left side. Elephant bones of similar mineralization were found in an identical formation nearby. Aveleyra quotes various scholars on the manner of formation of the deposit, including re-examinations extending into the last decade. Except for Hrdlicka's notorious denials of all such possibilities, the consensus of opinion seems to be that this fossil human skeleton is of considerable age.

In 1893, human footprints impressed in a stone block were found in the Sierra de Rincon de Guadalupe, Estado de Mexico. The engineer del Castillo believed the prints were made while the material was still plastic and connected the phenomenon with volcanism in the vicinity of the Nevado de Toluca. Ordoñez in 1945 suggested that this volcanism occurred at the end of the Pleistocene. Complications arise in whether the whole valley floor in this vicinity has been lowered by subsidence or erosion since the volcanism, and over the rate at which the activity progressed.

"El Hombre de Iztlan," found near Lake Chapala, Estado de Jalisco, is briefly discussed, for it was once thought to be of some geological antiquity. Palacios in 1931 reached the conclusion that the bones were contemporaneous with "Archaic" potsherds.

The famed carved sacrum of a Pleistocene llama, found at Tequixquiac in 1870, is next discussed. Though lost long ago, this object is clearly seen in Barcena's photograph, reproduced by Aveleyra. Two of the natural apertures represent eyes, while the lower part was carved into a snout and mouth, perhaps depicting a coyote or an "extinct swine." Found 12 meters deep in the now famously rich beds of late Pleistocene fauna at this site, the sacrum was encrusted in the same manner as many other fossils.

A number of assemblages of primitive artifacts from various areas are next discussed in some detail, with pertinent and acute observations of unbiased nature. Among these are 28 artifacts found by Müllerried in the Peten of Guatemala; 23 worked stones of "paleolithic aspect" found by Adan at Mitla; the relatively abundant but extremely crude flints from certain sites in Campeche which lacked any more refined artifacts, described in 1912 by Engerrand as the "industry of La Concepcion"; various simple tools from several localities which Hamy reported in 1884 as evidence of association of man with extinct animals, among them *Elephas colombi*; still other complexes from Tamaulipas described by Hughes in 1947 and MacNeish in 1949, by Müllerried from Coahuila in 1934, by Brand from Chihuahua in 1943, by Engerrand in 1913 from Baja California, and by Massey in 1947 from Baja California. Massey reported evidence of the splitting and burning of bison, camel, and horse bones in sites on the margins of now-extinct lakes.

At this point I must point out a slight deviation from Aveleyra's generally cautious consideration of evidence.

In most cases he personally examined the sites or specimens, or both; but the recent excavations of MacNeish in three rock shelters in the Sierra de Tamaulipas are reviewed solely from a manuscript on file in the Instituto Nacional de Antropologia e Historia. For some reason, this section is discussed in the most enthusiastic terms, as though a Pleistocene dating for the Diablo focus had been fully established. While much of this material can safely be referred to Aveleyra's "Prehistory," there is no valid reason for regarding the few artifacts of the Diablo focus as bearing any special connotation of age.[1]

MacNeish's Repelo complex, also cited, certainly marks a break from the artifacts of Mesoamerican agricultural and pottery-making peoples, but it must be realized here that northeastern Mexico presents a great area of resistance to the spread of these advanced traits. In the Formative ("Archaic") period, the northern boundaries of Mesoamerica rather clearly could not have been farther north than the Panuco River valley, and from here northward ceramic and agricultural practices belong to progressively later periods. Hence, by Aveleyra's definitions, "History" did not begin in the Rio Grande delta region until approximately the time of the Conquest (or even later), and over vast stretches of the interior it cannot be said to have begun at all. Between the heart of Mesoamerica and the northeastern fringes of Mexico, we may have to allow a time differential of 2,000 years or more for the onset of "History." The Repelo complex, then, probably represents but one part of a great area of simple material culture in northeastern Mexico and southern Texas which remained in a stage of "Prehistory" during the great developments in Mesoamerica.

Chapters III and IV are devoted to a general review and explanation of Tepexpan Man, discovered in the sediments of Lake Texcoco in 1947 by Dr. Helmut de Terra and associates. Aveleyra repeats much of the information on the skeleton, and on the geological and climatic interpretations, already given by de Terra in several publications. There is no need to repeat these data here, but I must state that Aveleyra's presentation is a model of systematic organization and clear writing. He is properly cautious about long-range climatic correlations in the present state of knowledge, yet the tables summarize these in the usual alignments. Some new points are made. For instance, the level of El Risco Lake III, with which de Terra correlated the skeleton, is given as 2,240 meters. Oddly, this is also the level of Lake Texcoco "in the first years of the Conquest" (p. 72).

There is no discussion of this situation, which seems to me important, for it is a little hard to believe that two lakes, existing some 6,000 to 8,000 years apart, would attain precisely the same level and that this level should also be that of the skeleton. The Barrilaco caliche was, however, formed during the time the lake fell below this level, hence this may be only a remarkable coincidence. On page 77 Aveleyra makes a flat statement that the skeleton was completely enclosed in the lower clay, and that the caliche was unbroken above it, eliminating any possibility of intrusion. He does not state whether this was his own observation at the time of excavation.

Aveleyra employs Antevs' most recent terms for the climatic periods involved at Tepexpan. Thus, El Risco Lake III and the uppermost of the Becerra[2] deposits are thought to belong to Antevs' Anathermal age, the Barrilaco caliche formation to the Altithermal, and the overlying Totolzingo soil to the Medithermal. Table V further presents a most interesting idea in that the Anathermal appears as the *terminal period of the Pleistocene* and includes the lingering fauna of the latter; the Altithermal and Medithermal form the post-Pleistocene or Recent. Thus, the Anathermal age is post-glacial and post-pluvial in the climatic sense, but is *not* post-Pleistocene because the latter is essentially a faunal term.

The general adoption of this definition would go far to relieve the present hazy thinking of geologists and archaeologists alike as to where to end the Pleistocene.[3] According to present calculations, the Anathermal age (and the Pleistocene in general) would then have ended at about 6000 to 5000 B.C., when the long period of desiccation known as the Altithermal age began.

Chapter V is a review of preceramic artifacts and possible artifacts on which de Terra based the San Juan and Tepexpan "industries," and the Chalco "complex." In many cases, Aveleyra casts doubt on the human origin of the "artifact," but in others they are real enough and it remains to be seen how they may be related to specimens from some of the older cultures in the United States. After citing such comparisons, Aveleyra (p. 107) cautions against the selection of specimens from large assemblages, the remainders of which are not to be compared with the Mexican groups under consideration. Certainly we must agree that selectivity

[1] In May 1949 two of these excavations were visited by the reviewer in company with geologist Glen L. Evans. In the rock shelter Tm 81, where the supposed Diablo Focus was first described, a short trench running down slope from the shelter floor reached the top of a small terrace remnant. A few fragmentary flint artifacts from the foot of this trench were not actually in the terrace, and there was no means of dating the latter in geological terms. Certainly the estimated age of 20,000 years for these artifacts is without foundation. The purported placement of the Repelo complex as earlier than "Archaic" is also without foundation, in my opinion, since this has merely been stated, not demonstrated by any specific situation.

[2] I was informed by geologist A. R. V. Arellano in Mexico City in June, 1950, that this is the correct terminology: *El Risco* for lake levels only, and *Becerra* for the sediments underlying the caliche. This and various other matters were discussed in my review of the *Tepexpan Man* publication (*American Antiquity*, Vol. 15, No. 4, pp. 343-49, 1950). Aveleyra has been most careful to employ the accepted geological terms.

[3] In a paper read before the annual meeting of the Society for American Archaeology in Norman, Oklahoma, May 19, 1950, I had proposed precisely the same definition. It would provide a further convenience if such a vague term as "Early Man" could be confined to man of the Pleistocene.

of this sort will make comparisons worse than useless, and I personally believe that any such work on relationships between the early cultures of Mexico and the United States can only be done comprehensively by archaeologists who know the material well in both countries. It is difficult enough as it is to get even the United States archaeologists to agree on a few formal types of projectile points and other chipped artifacts, and equally difficult to explain to the Mexicanists why we have made so little progress to date.[4] These problems must be solved jointly and by special effort if we are to work out relationships which are valid.

In conclusion, this is a most encouraging and thoughtful book by a young anthropologist from whom we will undoubtedly hear a great deal more.

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Flint Quarries—the Sources of Tools and, at the Same Time, the Factories of the American Indian, with a Consideration of the Theory of the "Blank" and some of the Technique of Flint Utilization. KIRK BRYAN. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. XVII, No. 3, Cambridge, 1950. 40 pages, 1 plate, and 20 illustrations in the text. $2.00.

Interest in artifacts from a functional standpoint has, in recent years, been somewhat overshadowed by the rapid development of regional chronologies and areal synchronizations in which artifacts are used as "horizon markers" without regard to their original manner of production and use. This short study by the late Dr. Bryan emphasizes *function;* it is an attempt to infer from the artifacts, and from the circumstances under which they were found, as much as possible of their roles in the cultures they represent.

Bryan first outlines his thesis: "(1) that many of the so-called 'blanks' and 'rejects' are usable tools, mainly axes, and that they were actually used; (2) that many flint quarries were not only sources of flint for export, but also industrial sites or factories to which materials such as wood and bone were brought to be worked in the presence of abundant tools." He then reviews "The Theory of the 'Blank'" as conceived by William H. Holmes, and demonstrates that it is entirely inadequate to explain the methods of manufacture of projectile points, knives, scrapers, and the other implements that Holmes believed were derived from "blanks." Bryan also comments on the tendency Holmes showed to ignore all artifacts but "blanks" in quarry debris, thus unintentionally distorting the available evidence to bolster his interpretation. Such criticism is not meant to detract from the importance of Holmes' pioneer work, but to re-use his material and substitute a more effective set of concepts for his restricted approach.

Three quarries are then described briefly, reviewing previously published accounts and presenting some new data. The quarries are (1) the "Spanish Diggings," or Peoria Quarry, of Oklahoma, (2) the Alibates Quarry north of Amarillo, Texas, and (3) the Cerro Pedernal Quarry, New Mexico. In discussion and illustration of artifacts found in these quarries, Bryan points out that "blanks" often show extensive wear and breakage from use, and that many flakes, cores and rough fragments likewise show use, although their production may have been incidental to the shaping of other tools.

Bryan argues that relatively light materials such as wood and bone were probably brought, for working, to the places where an unlimited supply of freshly made stone tools would be available; that is, to the quarries. If not, we must conclude that the Indians' limited means of transport were devoted to carrying away heavy stone tools whose useful life would be brief. Also, he demonstrates that the "heavy biface" was used as an axe, and after eventual breakage was an ideal source of large flakes from which smaller objects could be made. Bryan remarks that, "The common use of 'Clactonian' and 'Levallois' as the names of techniques in flint-working is here continued under protest." With this protest I heartily agree, and regret that Bryan did not propose new words by which these distinctive kinds of flint-working might be identified. The use of European site and period names in the New World has invariably caused confusion and misunderstanding.

There is also a short discussion of other quarry sites in the United States, and a description of several caches of flint objects in New Mexico and Texas. There remains much to be done, both in excavation or re-excavation and in analysis of the resulting data, before quarrying and flint-work are fully understood, but this study makes a vigorous beginning. So far, archaeologists have failed to determine the chronological position and cultural associations of most quarries, which will be necessary before functional interpretations have their fullest meaning.

In discussing the directions that future work might profitably take Bryan summarizes the categories of material that can be expected in quarry debris under fourteen headings or subheadings, making an effective contrast to the oversimplified view of Holmes that such material consisted of blanks, rejects, and waste.

If a criticism of this stimulating paper were to be expressed it would be of its brevity. Nevertheless, it is a well-rounded study reviewing and interpreting a considerable body of material, and drawing on a number of little-known sources. The illustrations are plentiful, most of them by the scratch-board technique, a method which, in the hands of an artist, surpasses any other for illustrating chipped stone. It is to be hoped that Bryan's numerous insights, suggestions, speculations and

[4] An example may be seen in the two objects in Pl. 21, A, B, already described by de Terra as "Folsomoid." While showing that such affinity is very doubtful, Aveleyra now considers the point in Pl. 21, B as more like a Plainview point. Unfortunately this identification cannot be supported either. There are probably many distinct types among the lanceolate-shaped projectiles, few of which have been properly defined.

conclusions will inspire the study of more quarries. A much larger body of information should be accumulated to substantiate and further refine the ideas he presents. It is high time that American archaeologists turned more effort to inferring, with proper care and caution, the actual ways of life of the prehistoric Indians from their artifacts. The definition of chronologies and culture areas merely furnishes a skeleton for which functional studies must provide a body.

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For the Dean, Essays in Anthropology in Honor of Byron Cummings. ERIK K. REED AND DALE S. KING, Editors. 307 pp., Frontispiece, 9 Figs., 7 Plates. Hohokam Museums Association and the Southwestern Monuments Association, Santa Fe, N.M., 1950. $6.00.

Those of us who have known Byron Cummings received the present book with thanks. The bibliography of Dean Cummings compiled by Gertrude Hill and the short biographical sketch by A. E. Douglass, at the beginning of the volume, are welcome additions to the collection of 21 papers making up the book.

The papers written by students of Dean Cummings cover a wide range of subject matter and are of very uneven quality. It is not stretching a point to say that some of the papers do not reach above the quality of seminar reports. Others, on the other hand, have much meat and may be classed as thoughtful and stimulating presentations of the particular writer's special field of interest. Most of the papers seem to center in drawing attention to Cummings' contribution or interest to the field discussed, with content often secondary.

One wishes the editors had written an introduction stating the principal theme, or lack of theme, tending to bind the papers together; if this had been done some of the above criticism possibly might not have been necessary.

The papers making up the present collection were submitted to the editors in the latter part of 1946 and early 1947. The time elapsing between date of receipt and publication has in some instances made revision necessary, but this could not be accomplished. This in no way places blame on anyone's shoulders since we all recognize the problems besetting publishers within the last few years.

Six papers seem to stand out and demand careful reading by anthropologists. "Ceramic Traits and the Nature of Culture Contacts Between Anasazi and Mogollon" by E. T. Hall and "Notes on Plains-Southwestern Contacts in the Light of Archeology" by Waldo R. Wedel are of interest to the archaeologist. Ethnologists will be interested in "Mechanics of Perpetuation of Pueblo Witchcraft" by Florence M. Hawley, "The Military Orientation in Yaqui Culture" by Edward H. Spicer, and "Ethnic History of Tucson, Arizona" by Harry T. Getty. The paper by Gordon R. Willey, "Growth Trends in New World Cultures," is especially stimulating for the theorist, and was given serious consideration in manuscript form by Julian Steward's "Cultural Causality and Law" in the *American Anthropologist* for January-March, 1949.

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Los Chortis Ante El Problema Maya. RAFAEL GIRARD. Mexico, D.F., 1949. Vols. 1-5, 1,821 pages, illustrated.

Sr. Girard's work is large both physically and in its scope. For aid in its assimilation I am indebted to Mr. Hasso von Winning who, delving deeply, has come up with considerable information I had missed. The subtitle *Historia de las culturas indigenas de America, desde su origen hasta hoy* brackets the scope of the work. In his preface Girard, emphasizing the spiritual values of the Maya culture, claims that an understanding of the modern Chortis can give the key to ancient Maya religion, which in turn is fundamental to an understanding of New World culture. Hence he places the Maya religion at the center of his study.

Volume I describes the Chorti, their area, demography, physical characteristics, language, ethnography. Much of this material is based on original work and is very useful. Volumes II and III attempt to reconstruct the Maya religion and world view from modern survivals linked to the documentary and archaeological remains. The reviewer does not feel competent in this exceedingly complex field, but the general impression given by the text is that Sr. Girard has convinced himself that most elements in Maya design bear an esoteric symbolism which he can explain. For example, the number of repeats in geometric band designs are symbolic, and also the stepped fret over all its wide New World range denotes the cloud serpent, according to Girard.

Volume IV explains the Popol Vuh and other native Middle American chronicles, assuming that the four sequent culture stages of the Popol Vuh are historically reliable, and continues with a historical synthesis based on the Chronicles.

In volume V, Girard attempts to fit archaeological studies, which he believes ultimately sterile in their present form, into an account bolstered by the background of the previous volumes. He points out uncertainties in the archaeological chronologies and proposes the Popol Vuh as a correct historical account of the culture stages. Certain of his artifact time placements are based on stylistic arguments, which are sometimes hard to follow, and vary strikingly from archaeological determinations. Although Maya archaeologists have been strongly attacked in recent years for their failures in culture reconstruction, their chronological sequences are in the main firmly fixed and reliable. The reviewer finds a large gap between Girard's and the dirt archaeologists'

Maya. Since the known materials on Maya culture present considerably greater complexity than those of any other American culture it is not surprising that confusion should arise among workers approaching them with various viewpoints. The reconstruction of Maya culture is the desire of all workers; their complementary techniques will bear closer integration.

The volumes contain no index other than a table of contents. The bibliographic references are infrequent, placed as footnotes, and do not include page references; there is no general bibliography. Sr. Girard seems to have read intensively the sources in Spanish, but coverage of archaeological publications which have appeared in English is spotty.

The size of this work, coupled with its unconventional organization and approach, will probably discourage many readers. Sr. Girard's courage in tackling so complex and broad a subject is to be admired.

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BOOK NOTICES

Art of the Northwest Coast Indians. Robert Bruce Inverarity. University of California Press, Berkeley and Los Angeles, 1950. xiv + 243 pp., 280 illus. (7 color plates). $10.00.

The fullest coverage to date of the striking and important native art of the Northwest Coast, beautifully produced, with splendid illustrations, largely of specimens never before published, and with highly worthwhile text discussion, especially of "primitive" art in general and of the significance of Northwest Coast art in particular. Of special interest to archaeologists are the general treatment of material culture; the discussion and illustration of stone sculpture from the Fraser River delta, and other unusual and relatively crude stone carvings; and the illustrations of designs which suggest, at least to me, both the general Middle American area and Shang dynasty China, and, in fewer cases, Old Bering Sea art and the Scytho-Siberian animal style. The only such comparisons noted by the author are in a few instances of stone effigies quite suggestive of Mayan (and Spiro, etc.) work.

The stylistic analysis is fine, and the general handling of the material as a major integral aspect of Northwest Coast is admirable, but there is virtually no discussion of the probable history and relationships of the art. The most striking items are the various amazing or amusing masks. Rattles, adzes, clubs, spoons, and other decorated utilitarian objects are included; basketry and textiles are not covered. In the general introductory discussion, the paragraph on languages is inadequate and slightly confusing; the summary of Northwest Coast history, necessarily brief, is rather good. The section on Social Patterns is very clearly and interestingly written. Altogether, this is an admirable and outstanding publication.

Fighting with Property, a Study of Kwakiutl Potlatching and Warfare, 1792-1930. Helen Codere. Monographs of the American Ethnological Society XVIII. J. J. Augustin, New York, 1950. vii + 135 pp., 5 illus., tribal and linguistic map, and 20 tables. $3.00.

A detailed study, with general background on history and acculturation, emphasizing (Chapter 2, pp. 8-61) "Kwakiutl adjustment to the new economic conditions," with detailed information on population, income, and occupations. The famous potlatches are interpreted as a shift from physical violence and warfare as a means of expressing rivalry for purposes of social prestige in the historic period.

Hopi Kachina Dolls, with a Key to Their Identification. Harold S. Colton. University of New Mexico Press, Albuquerque, 1949. xv + 144 pp. $7.50.

A well-illustrated explanatory catalogue of 250 of the kachinas—gods or nature spirits—of the Hopi Indians as represented by painted wooden figurines, carefully compiled by the Director of the Museum of Northern Arizona, of interest to all Southwesternists.

Morleyana. Edited by A. J. O. Anderson. Museum of New Mexico and School of American Research, Santa Fe, 1950. xii + 268 pp. $10.00.

A limited edition, beautifully designed and produced, of a collection of tributes to, impressions of, and reminiscences involving the late Sylvanus G. Morley (1883-1948), by sixty of his many friends.

NOTES AND NEWS

GENERAL

There seem to be no actual new finds of remains attributed to early man in the reports of this quarter. A pair of articles by Frank Roberts and Ralph Solecki in the *Scientific American*, January and February numbers respectively, sketch the present general status of the subject quite well. Attention is directed to Krieger's review in this issue of Sr. Luis Aveleyra's *Prehistoria de Mexico*, in which aspects of this general topic are treated.

Renewed interest in the field of "primitive" art as art, rather than as historical material, is exemplified by such publications as Bruce Inverarity's fine *Art of the Northwest Coast Indians* and others, and by special exhibits; the University Museum at Philadelphia held its first exhibition of "Works of Art" from early December to mid-February, selecting a large variety of individual objects which are beautiful in themselves aside from historical significance, ranging from weapons to statuettes. This is not a reversion to the old-fashioned kind of museum but is a trend paralleling and supplementing the development of modern organized explanatory exhibits exemplified by the excellent newer ones in the Chicago (Field) Museum of Natural History, some of the small archaeological and historical museums of the National Park Service system, and various other comparatively recent localized (state or regional coverage) installations such as that in the new Museum of Anthropology of the University of Utah and that being worked up by Dr. and Mrs. W. C. Holden in the new museum at Texas Technological College in Lubbock, where several very interesting experiments are tried. In the archaeological museum line, the most striking news is that Eric Douglas, having been turned loose by Jo Brew on the Peabody Museum (Harvard) has completely revamped the North American ethnology room there into a magnificent show.

SOUTHWEST

The El Paso Natural Gas Company's archaeological survey and salvage program, arranged by Jesse L. Nusbaum and directed by Fred Wendorf under Nusbaum's supervision, along the pipeline right-of-way in New Mexico and Arizona during the fall, has been continued from Ashfork to Topock, Arizona. An unexpected group of sites was found fifty miles west of Ashfork. In January the company made a grant to finance laboratory studies, and the preparation of final reports, to be published by the Museum of Northern Arizona. Paul Ezell and Wesley Bliss are working in Tucson on their reports on survey and excavations in Arizona, and Francis Cassidy is working at the Laboratory of Anthropology in Santa Fe on his and Wm. Bullard's findings in New Mexico last fall.

Another unusual archaeological job is the intensive study this past fall and winter of Navajo history and archaeology by Malcolm Farmer, formerly director of the San Diego Museum of Man, as the staff archaeologist of the Navajo Tribal Council in connection with land claims against the United States, involving about $8,000,000; this constitutes an unquestionably practical application of archaeology. The opposition expert, the witness for the defense, is reported to be W. W. Hill. Vigorous cross-examinations are hoped for by all bystanders.

A. H. Schroeder of the National Park Service at Boulder City, Nevada, is making, in February and March, a rapid intensive survey of the Lower Colorado River from Pyramid Canyon (Davis Dam) to Yuma, Arizona. In cleaning up Site 16, recently excavated at Mesa Verde National Park, Don Watson and Al Lancaster picked up a third kiva, adding interest to the already complicated picture at this little ruin.

Other than these special or minor projects, about the only winter field work reported in the Southwest is that of the Amerind Foundation; continued excavations by Charles di Peso at the site of Quiburi, close to the proposed Charleston Dam location on the San Pedro River, where a quite extensive and interesting cremation cemetery was uncovered in December.

The technical bulletin series of the University of Utah has been revived under the title "Anthropological Papers" with the appearance of No. 9 (*An Archaeological Reconnaissance in Washington County, Utah*).

PACIFIC NORTHWEST

Charles E. Borden, University of British Columbia, and Wilson Duff, Provincial Museum, are getting an archaeological survey of British Columbia under way. Site forms and information blanks are being widely circulated throughout the province to get as much local information as possible on the location of sites and collections. Duplicate files will be kept at the two institutions for reference use and future planning of field work. Both the University and the Museum are working actively with Douglas Leechman and the Canadian Museums Association to get legislation to preserve important archaeological sites for future excavation and to secure funds for emergency excavation of sites which will be destroyed when power dams now planned go in.

Carroll A. Burroughs will direct the University of Washington's sixth annual summer field session in archaeology this summer. The group, composed of students who desire training, will excavate a portion of a village site on San Juan Island.

John E. Mills, graduate student at the University of Washington, plans to start a pre-doctoral research project this summer at Nootka Sound, Vancouver Island, British Columbia. The project is to be a continuance study encompassing the archaeology, documentary background, ethnography and acculturation of the Indians of Nootka Sound. Rodger Heglar, graduate student at the University of Washington, has begun a study of all of the skeletal materials available from Plateau sites.

Records and materials from the River Basin Surveys excavations of last summer are currently under study at

Seattle and Pullman, Washington, and at Eugene, Oregon. At the University of Washington-RBS laboratory in Seattle, Douglas Osborne and a staff of student assistants are working up the materials from Chief Joseph, Equalizing, and McNary Reservoirs; Richard Daugherty, State College of Washington, Pullman, is processing data from O'Sullivan Reservoir; and Joel Shiner, at the RBS laboratory in Eugene, is writing up the results of two large excavations in the McNary Reservoir.

L. S. Cressman, University of Oregon, plans a field camp in archaeology and another in ethnology for this summer. These will be integrated with the summer session work of the University. Work will be carried on in eastern Oregon to finish up certain of the loose ends on Klamath archaeology. Additionally, a grant has been made by the Viking Fund to the University of Oregon for a five-year program on the archaeology of the Oregon Coast from the Columbia River to northern California. Mr. Lloyd Collins, graduate student at the University of Oregon, will carry out a survey of part of the coast this spring under the direction of Dr. Cressman.

PLAINS

The Eighth Plains Conference for Archeology met at Lincoln, Nebraska, November 23 to 25, 1950. Eighteen field reports on archaeological investigations throughout the Plains from Texas to Canada demonstrated the unprecedented amount of intensive work carried on by River Basin Surveys and other institutions in one season in the Plains. Summaries of the work have already appeared in NOTES AND NEWS but a few additional facts and interpretations are in order.

Donald J. Lehmer reported the excavation of 26 houses, 73 cache pits, and 36 miscellaneous features at the Dodd site, 39ST30, and at the Phillips Ranch site, 39ST14, in the Oahe Reservoir, South Dakota. The Dodd site contained round houses associated with simple stamped pottery and a few pieces of metal of European origin superimposed on prehistoric rectangular houses associated with cord roughened pottery. The Phillips Ranch site produced round houses and pottery similar to the upper level at Dodd, but there was abundant European trade material. Similarities of the contents of the Phillips Ranch site and the upper level of Dodd to what is usually called Arikara were noted in the discussion. Wesley Hurt found the houses and pottery of the lower level of Dodd to have some relationships with the complex which he unearthed at the Swanson site (39BR16) in the Fort Randall Reservoir, South Dakota. Carlyle Smith saw a few similarities between the pottery of the upper level at the Talking Crow site (39BF3), Fort Randall Reservoir, and the round house culture at the Dodd and Phillips Ranch sites, but observed no relationship between his material and that from the Swanson site and the lower level of the Dodd site.

John Champe reported on the results of additional work at Signal Butte in the company of W. D. Strong and others. It was revealed that Signal Butte I may constitute more than one level in a limited area of the site but that the original identification of it as a single level in other parts of the site is supported by the recent excavations. The principal reason for the return to Signal Butte was to collect samples of carbon for dating purposes at Columbia University.

John Champe led a symposium on physical anthropology in which Russell Newman presented a paper on crania from a site near Mobridge, South Dakota. The discussion also covered various aspects of the problems involved in the excavation and preservation of skeletal remains, and the ultimate value of fragmentary and poorly preserved specimens to the physical anthropologist.

A number of formal papers were read at other sessions. Preston Holder discussed the characteristics of the method of colonial penetration on the part of the French in the Plains. He emphasized that competition between the various trading organizations, both legal and illegal, led to secrecy in regard to the exact locations of villages in the records, thus handicapping present research in the documentation of historic sites. Paul Tolstoy interpreted the archaeology of the Upper Missouri in terms of the pottery in collections at Columbia University. He identified three basic traditions, one leading to the pottery of the historic Arikara, another to that of the historic Mandan and Hidatsa, and a third of unknown affiliation but extending into the period of trade with Europeans. Wilfred Logan described the contents of Graham Cave in central Missouri, an archaic site with widespread affiliations, especially with the Pickwick aspect.

A paper by Theodore White was concerned with the identification of butchering techniques as revealed by a study of the bones of animals found in an archaeological site. David Gebhard discussed the petroglyphs found in the Boysen Reservoir. Wesley Hurt described an earth lodge used recently by the Dakota on Crow Creek Reservation, South Dakota. George Will discussed the possible correlations between the number of earth lodges and the amount of arable land available as clues to the populations of villages on the Upper Missouri. He estimated that the average village must have housed from 600 to 800 persons.

W. D. Strong led a symposium concerned with the classification of archaeological complexes in North and South Dakota. The primary purpose of the symposium was to set up a taxonomic framework which does not imply affiliation with historic tribes when documentation is lacking. Carlyle Smith set up a tentative framework based on the McKern classification in which Grand River aspect was substituted for Arikara, Heart River aspect for Mandan and Hidatsa, and La Roche aspect for sites containing pottery different from Grand River and Heart River and not identifiable with historic tribes. All three aspects extend from the late prehistoric into the period of trade with Europeans. The term, Mill Creek aspect, a complex lacking adequate definition but referred to in the literature, was used to designate a cul-

tural division which appears to be ancestral in part to the Heart River aspect. The symposium could not agree upon a suitable term for such manifestations as the Arzberger site which has certain traits in common with the Upper Republican aspect. The classification of various Woodland and lithic cultures was not discussed at the symposium.

River Basin Surveys and cooperating institutions using funds granted by the National Park Service plan to continue their excavations in the summer of 1951 concentrating on sites along the Missouri River in North and South Dakota.

The *Proceedings of the Sixth Plains Archeological Conference* (1948) appeared, late in 1950, as No. 11 of the Anthropological Papers of the University of Utah.

NORTHERN MISSISSIPPI VALLEY

Illinois. Dr. Thorne Deuel of the Illinois State Museum reports that during the week of October 8-14 a field party under the direction of Melvin L. Fowler, Curator of Anthropology, excavated some control areas in the Clear Lake Village site near Manito in Tazewell County, Illinois, to determine the stratigraphic position of some pottery types recently reported from the site. During the spring of 1951, Georg K. Neumann, on leave of absence from Indiana University, will supervise the installation of a new museum exhibit of the modern races of man and their primate and human forerunners. During this period Dr. Neumann and Fowler will complete for publication the study of cultural and skeletal materials recovered from the Ethel R. Wilson and Hubele sites in White County, Illinois. The material was obtained through field work carried on in the 1950 field season by a combined expedition of the Illinois State Museum and the University of Chicago Department of Anthropology.

On April 13th and 14th, the Illinois State Museum is inviting those interested in determining a suitable classification for Hopewellian pottery, especially that of Illinois, to a conference to be held at the Museum. Dr. James B. Griffin has agreed to make the initial separation of types and prepare the Museum collections to illustrate the range and sequence of types.

Ohio. Mr. Raymond S. Baby reports that the work of the Ohio State Museum for the coming season calls for survey and exploration in reservoir areas in Ohio. New interpretative exhibits at some of the State Memorial Museums will be installed.

SOUTHEAST

At an informal conference held in conjunction with the annual meeting of the Society for American Archaeology at Norman, Oklahoma, in May, 1950, it was decided to reactivate the *Southeastern Archeological Conference*, dormant since early in the war. Accordingly, the first new meeting was held at the University of Tennessee, Knoxville, in October, 1950, attended by most of the active workers in the field. The theme was a re-examination of stamped pottery types.

Officers elected for the coming year are John M. Goggin, Chairman, and William Haag, Secretary and Editor. The next annual meeting of the conference will be held at the University of Florida in the fall of 1951. Its theme is to be the classification of chipped stone work.

It is planned to renew issuance of the *Newsletter*. Individuals and libraries desiring back issues of the *Newsletter* may obtain several numbers from William Haag, University of Mississippi.

Kentucky. In Mason county about one-half a mound (Ms27) showing both Adena and Hopewell connections or influences was excavated this summer by Richard S. Woodbury and William Webb of the University of Kentucky. Twenty-six burials were found including one cremation of four individuals. Mica and copper were present and most burials lay between layers of bark. A few had logs over or next to the skeletal remains.

Georgia. Kolomoki State Park has recently installed the first set of exhibits in its new museum. When completed, the museum, in conjunction with the covered burial mound, will offer the visitor a rounded picture of the site's culture.

Florida. During the fall and winter the University of Florida continued its mission site survey in Northern Florida. A deep stratigraphic test at Rollestown on the St. Johns River gave a somewhat confused but long sequence from the Orange Period (fiber-tempered pottery) through the St. Augustine Period (Spanish Mission influence). Between semesters a party of ten will test an early site on Lostman's River in the Everglades National Park.

Mississippi. Excavation completed in 1950 at the Gordon Mound and Village site, MJe-1, located twenty miles north of Natchez, Mississippi, is being followed by laboratory and date studies at Natchez Trace Parkway headquarters, by Archaeologist John L. Cotter of the Parkway staff. The work was undertaken by the National Park Service as a salvage operation in advance of construction of the motor road, and information gained will be used in interpreting the story of late-prehistoric Indian life along the 500-mile Natchez Trace between Nashville and Natchez by the National Park Service. A final report is currently being completed. The report on the Bynum site, by Cotter and Corbett, is in press (January).

The two domiciliary mounds and associated village at the Gordon site may be placed in the Coles Creek-Plaquemine-Natchez horizon and may extend downward toward Marksville. Remains of cultural significance, aside from the 23,000 potsherds, are two rectangular trench mold structures located within the fill of mound B, and superimposed partially upon a larger circular pattern of singular post molds. Within the first fill of mound B were also clusters of child skulls, fragmentary human burials, mostly extended, and certain Natchez lithic associations.

CARIBBEAN

A *Round Table Reunion of Caribbean Anthropologists* met in Havana, Cuba, September 12-15, 1950, called by the National Archeological and Ethnological Commission of Cuba and jointly sponsored by several other local organizations. Its object was to consider problems of archaeological and cultural taxonomy in the Caribbean area. North Americans present included Irving Rouse, Herbert Krieger, Hale G. Smith, and John M. Goggin. Representatives from Venezuela, Colombia, Costa Rica, Haiti, and Puerto Rico, along with numerous Cuban archaeologists, completed the group.

Under the presidency of Jose M. Cruxent the group discussed various problems, finally agreeing on a revised set of cultural terms for Cuba. Consideration was given to synonymy of artifact terms and a committee was appointed to continue their study. The final product of the conference was the establishment of a Caribbean Anthropological Federation which will carry on the work begun and will meet every two years. Its headquarters will be in Cuba.

Foreign visitors were flown to Banes, Oriente, in Eastern Cuba on September 16, where they stayed until September 19. Current research excavations of the Grupo Arqueologico "Guama" were examined. The foreign guests as a group were unanimous in their praise of the hospitality extended to them by their hosts.

On December 7-9, 1950, the University of Florida was host to a conference, *The Caribbean at Mid Century*. One of five round tables was "Sociological and Anthropological Problems of the Caribbean Area." Speakers included John Gillin—"Is There a Modern Caribbean Cuture?"—and Jose Cruxent who spoke on prehistoric migrations and cultures in Venezuela.

The British Museum has acquired from the Oldham collection a unique wooden *duho* (cacique's seat) from Santo Domingo, illustrated in the 1949 annual report of the National Art Collections Fund. One end is formed as the head and arms of a man, the eyes, mouth, ear lobes and depressions on the shoulders being inlaid with gold leaf. Stools of this kind are extremely rare, and no other with gold inlay is known, although Antonio de Herrera reported specimens so decorated.

MIDDLE AMERICA

Mexico. The tragic death on January 1, at Azcapotzalco, of Robert Barlow deprives Middle American research of one of its most outstanding men. A superb linguist with an incredible ability to find his way through the muddled historical sources of the Mexican plateau and a painstaking and brilliant scholar, Barlow had established in a few years a remarkable reputation as the authority on Mexican history from the 14th to 17th centuries. He had recently turned his attention to the Maya field. He had exactly the qualifications and attainments for such lines of research. Ignacio Bernal hopes to keep *Tlalocan* running. This important little journal Barlow had edited and published on less than a *guarache* string.

After innumerable postponements, the fifth Round Table meeting, sponsored by the Sociedad Mexicana de Antropologia, will be held at Jalapa, Veracruz, July 20-30. There will be discussions on the archaeology, ethnology, physical anthropology, and linguistics of Veracruz and contiguous regions. The identities of the cultures denominated Olmec, Totonac, and Huaxtec will be threshed out, and that should provide more than one source of innocent merriment. Jalapa is a charming town, and the subjects to be examined are of great importance.

Silvia Rendon, visiting research associate at Tulane for a second year, has transcribed and translated the Nahua legal document, *Ordenanza del Señor Cuauhtemoc*. Her monograph on modern pottery-making at Cuauhtitlan contains an introduction and conclusions of interest to archaeologists. Both papers are in press.

Members of the Instituto Nacional de Antropologia e Historia continue their activities. Ignacio Bernal reports that Hugo Moedano has discovered a very large site, called Piedras Paradas, in the Municipio of Chautla, Puebla, close to the Guerrero border. There is a huge hall surrounded with columns of masonry and very many mounds; he will make preliminary excavations this year. At El Corral, near Tula, Jorge Acosta uncovered a semi-circular structure resembling that of Calixtlahuaca, and containing many burials. Local museums have been opened at Tula and Monte Alban.

The Museum of Popular Art will open at the end of February in what was the beautiful old church of Corpus Cristi. It is under the Instituto Indigenista Nacional, of which Dr. Caso is director. Covarrubias has painted a charming fresco-map for the walls. Annexed to the museum will be a store, in which truly indigenous articles of merit will be sold to encourage the production of good stuff.

The British Museum has acquired from the Oldham collection a magnificent wooden *teponaztli* (no locality, but surely Mexican plateau) with an owl carved on the side. This is illustrated in the annual report for 1949 of the National Art Collections Fund (Hertford House, Manchester Square, London, W.I.).

Maya Area. The retirement of Dr. A. V. Kidder from the chairmanship of the Division of Historical Research, Carnegie Institution of Washington, marks officially the end of an epoch in Maya research. When Kidder and his pupil, Vaillant, first entered this field the techniques were those of the antiquarian; effort was directed to discovering the spectacular, and no one bothered much, if at all, with plain sherds or fragmentary stone implements. As soon as Kidder took over, he shifted the whole emphasis to the concept of stratigraphy as the key to history, the approach he had done so much to introduce earlier in the Southwest. Through his work and that of Vaillant, the new methods took hold in Mexico, and the whole framework of Mesoamerican history, as we now have it, is the result. This is a mighty monument to the work and influence of one man.

The writer has a vivid recollection of Ted Kidder's first contact with the Maya, when he visited Yucatan in 1926. A trip to Coba was arranged, and that involved spending a night in Valladolid and starting next morning on mule-back. The owner of the house on the outskirts of the sleepy town showed us where we were to pass the night. It was one of those long, whitewashed rooms, typical of Yucatan, entirely bare of fittings except for hammock hooks and without a stick of furniture except for a large bed-chamber which rested on the floor in the exact center of the room. Memory plays one tricks after a quarter of a century, but your assistant editor maintains he heard Kidder murmur to himself "White ware. Everted rim. One vertical handle. Flat-based." It was the first classification of a Yucatecan ware, and was to symbolize the new approach.

Work by Carnegie on a smaller scale was renewed this season in Yucatan. A staff conference to survey the problems arising from the first season's work will be held at Mayapan in May. Satterthwaite returns to British Honduras, with plans to work at Caracol and Benque Viejo. An architect, one of his party, is already at Benque Viejo, making scale drawings of the magnificent stucco facade mentioned in the October, 1950 issue of *American Antiquity*.

Clement W. Meighan and J. A. Bennyhoff spent two months excavating in British Honduras, concentrating on a large midden on Potts Creek, about 25 miles north of Belize and about two miles from the coast. The lowest levels yielded pottery much like San Jose V; material became plainer and cruder as one worked up, and there were apparent indications of progressive degeneration. A most unusual feature is a ware which floats—pottery, not soap; a very high pumice content is suspected. This work is important for the light it can throw on post-San Jose V occupation of the colony.

Alberto Ruz L. continued excavations at Palenque in 1950, and was rewarded by the discovery of a second superb stone tablet. The magnificent carving shows three persons, one of whom is presenting a headdress to the chief, who sits cross-legged on two crouching slaves; the glyphs almost surely place the tablet at 9.15.0.0.0 (A.D. 731), a period hitherto unrecorded at Palenque. Another find of importance was a squat vase with flaring base carved with an Initial Series which can be restored as 9.18.7.10.13 (A.D. 798), the latest date known at Palenque. The text is a genuine record, not a fancy piece of carving, and is the only carved Initial Series ever found.

Purely archaeological activities at the Middle American Research Institute, Tulane University, are somewhat in eclipse as other fields of social science are being stressed in the Institute's recently initiated program of inter-disciplinary research, according to Robert Wauchope, director. Barrera Vasquez returned for a second year as visiting research associate. In addition to his class in linguistics, he has an advanced course in protohistoric ethnology of Mexico and Yucatan, based on archaeological and native documentary sources; his translation of the *Cantares de Dzitbalche*, mentioned in our last summary, will be published by the Institute this year.

Tulane will conduct a summer school at Quetzaltenango, Guatemala, this summer. Students and faculty will visit Chichen Itza, Uxmal, Kabah, and Copan, and then proceed through the Guatemalan highlands, studying ancient sites and modern municipalities and villages en route. Formal instruction at Quetzaltenango will be inter-disciplinary, covering archaeology, anthropology, linguistics, sociology, geography, history, etc., all bearing on the role of the Indian in Latin America, past and present. The summer school is supported by a grant from the Carnegie Corporation, and is the fourth cooperative summer school of Latin American studies at Vanderbilt, Texas, North Carolina, and Tulane, respectively.

Frans Blom and Gertrude Duby plan a summer school at San Cristobal Las Casas, Chiapas. Emphasis is on practical field experience, outfitting, etc., with trips to ruins and nearby Tzeltal and Tzotzil villages. Time: July 1–August 15; cost: $250 F.O.B. Tuxtla Gutierrez; address: Av. Vicente Guerrero 38, San Cristobal Las Casas.

Stanley Boggs continued excavation at Tazumal during 1950, and a museum on the site is nearing completion. Certain new finds suggest contact with the Pacific coast of Guatemala rather than with the Maya. Limited excavations also were made at San Andres Campana.

SOUTH AMERICA

Chile. Francisco L. Cornely, Director of the Museo Arqueologico de La Serena in northern Chile, calls attention to the active work being done by local archaeologists in the Province of Coquimbo of which La Serena is the capital. The museum was established in 1944 and now contains an archaeological collection of 2,300 specimens and a historical collection covering the four hundred years of the city's existence. Its address is: Casilla 125, La Serena.

La Serena also has an archaeological society (Sociedad Arqueologica de La Serena, same address) which works in close cooperation with the museum. The Society issues a *Boletin* of which No. 1 appeared in October, 1945. Four numbers have appeared to date and a fifth is ready for publication. The *Boletin* contains a series of important and well illustrated articles on local archaeological problems, many of them by Cornely who has been studying the archaeology of the region for more than fifteen years. A long report by him on the so-called "Chilean Diaguita" culture is scheduled to appear in the next number of the *Revista Chilena de Historia Natural*.

Colombia. Gerardo Reichel-Dolmatoff has left the Instituto Etnologico del Magdalena in Santa Marta, which he directed from 1946 to 1950, and is now living in Bogota (address: Apartado Aereo 5703). He is preparing a series of reports on his archaeological work in the Santa Marta area, of which the first, dealing with mid-

den excavations in the valley of the Rancheria River, is scheduled to appear in 1951. The following notes are based on an advance copy of the English summary which the author was kind enough to furnish.

A sequence of two cultures was found, and each of the two cultures is divided into two phases. The earlier culture (La Loma and El Horno phases) is characterized by a gradual development from polychrome to bichrome wares, both using a white or cream slip. The sigmoid scroll is a prominent decorative element. Gray or brownish culinary wares develop into red wares, of which several subtypes are distinguished. The later culture (Portacelli) has an entirely different style characterized by finely made cups with bird designs in black on red. Corrugated wares and metates and manos, all of which were absent from the earlier culture, are found in the later one. A series of types of clay figurines and objects of bone, shell, stone, and other materials can be related to the pottery sequence.

The Rancheria sequence can be linked by trade pieces to a sequence established in the neighboring Sierra Nevada area. The latest Rancheria occupation corresponds to the earliest Sierra Nevada materials, materials which precede later phases with evidence of Spanish contact.

The valley of the Rancheria is now arid and unattractive, yet the archaeological evidence suggests a dense agricultural population in prehistoric times. Reichel is much interested in this phenomenon and offers a hypothesis to explain it. He suggests that the progress of agricultural settlement in the Sierra Nevada in ancient times was accompanied by deforestation and periodic burning, drying up the valley below and increasing soil erosion. The abundance of rabbits and goats in the area in colonial times may have contributed to the dreary picture which the valley of the Rancheria presents today.

The importance of the work described in this report, in an area where no stratigraphy had previously been reported, needs no emphasizing.

Peru. J. H. Rowe gave a seminar in Peruvian archaeology at the University of California (Berkeley) in the fall semester of 1950—the first time such a course had been offered since Kroeber gave one in 1942. A number of important ideas emerged from the work of the group. These ideas will eventually be the subject of more extensive publication.

Specifically Rowe undertook to test a theory of Rafael Larco's against Max Uhle's Early Chimu grave lots from Site F at Moche. In his *Cronologia arqueologica del norte del Peru* (1948) Larco suggested the division of the Early Chimu style into five substyles with chronological significance. The examination of Uhle's grave lots corroborates Larco's theory in every respect.

Other significant findings of the seminar included James A. Bennyhoff's analysis of the earlier part of the Viru sequence as presented in Ford's great 1949 report. He concluded that the plain wares labelled "Puerto Moorin" probably represent a terminal phase of Guañape and that no evidence has been presented that they are associated with the White on Red decorated style called Salinar in Chicama. The White on Red sherds found are contemporary with Gallinazo. There were some intrusions of each into the territory of the other, and Gallinazo lasted slightly longer—long enough to overlap Moche I. Reexamination of the "horizon style" concept as currently used in Peruvian archaeology is clearly indicated, for White on Red and Negative have been treated heretofore as separate horizons.

On May 21, 1950, Cuzco, the ancient capital of the Incas, was shaken by a violent earthquake, the worst since 1650. The damage to the city was so severe that early reports spoke of it as "destroyed." None of the published reports or pictures give any systematic account of what happened to the numerous Inca walls and other points of archaeological interest in and around the city. From Oscar Nuñez del Prado, Professor of Ethnology at the University of Cuzco, the following report was received:

The most serious damage was done to colonial and modern buildings. Several of the finest 17th century churches suffered very severely, especially Belen, Santo Domingo and San Sebastian, which lost parts of their towers. The cupolas of the Compañia were badly damaged. Several of the old porticos of the Plaza de Armas were completely destroyed. Many of the walls that did not actually fall were so badly cracked that they may have to be taken down. The University and Museum buildings were all badly damaged but the collections are intact and no books were lost either from the University library or from the archaeological library.

On the whole, the walls of Inca masonry suffered comparatively little. In a number of the walls of the Temple of the Sun, including the famous curved retaining wall, there has been some separation of the stone blocks and a few blocks have cracked. The great diorite wall of Hatunrumiyoq, one of the solidest in Cuzco, shows some separation of blocks, and the associated andesite walls of coursed masonry are both cracked and somewhat displaced. A number of the less well known Inca walls show some separation or displacement but few blocks have actually fallen.

The destruction of more modern buildings has brought to light a number of previously unrecorded sections of Inca wall. The most important of these is on Santa Catalina Angosta street, just off the Plaza de Armas. In demolishing damaged houses here, a fine masonry doorway with eight to ten feet of wall on each side was exposed. Part of the doorway was destroyed by careless bulldozer work. Over twenty feet of the long wall on the Callejon de Loreto, one of the finest in Cuzco, was likewise destroyed by careless demolition crews.

Little damage is visible at the Fortress of Sacsahuaman, beyond a single block fallen from the uppermost fortification wall. No report was received on the sites

further from the city. There has been much talk, both in Cuzco and in Lima, of an elaborate reconstruction program, but it has brought little action to date.

GILA PUEBLO TO BE TRANSFERRED TO UNIVERSITY OF ARIZONA

The vast collection of Gila Pueblo, an incomparable assemblage of Southwestern archaeological material, has been transferred to the trusteeship of the University of Arizona, it was announced jointly on December 16, 1950 by the University and the donors, Mr. and Mrs. Harold S. Gladwin. The transfer, including the physical plant at Globe, Arizona, all equipment and records, was made, Mr. and Mrs. Gladwin stated, to assure the permanent usefulness of this material to scholars and students.

Gila Pueblo was founded at Globe in 1928 by Mr. and Mrs. Gladwin, appropriately on the ruins of a six-hundred year old pueblo. Since then it has been the center for their own archaeological researches and under their vigorous direction and sole support, has made an outstanding contribution to our knowledge of prehistoric life in the Southwest. This has been achieved through extensive surveys and the excavation, partially or wholly, of fifty ruins. Notable among these excavations have been those at Snaketown, which disclosed for the first time the varied and little known culture of the Hohokam, and the Harris and Mogollon Villages, which brought the Mogollon Culture into being.

The results of Gila Pueblo researches have been made available in the widely known *Medallion Papers*. Thirty-nine scientific monographs under this name have appeared.

The Gila Pueblo collections and records will be housed in the Arizona State Museum, on the campus of the University of Arizona at Tucson, where they will be available to all students of the prehistory of our country.

NOTE

The 1951 meeting of the Southwestern Division, A.A.A.S., will be at El Paso, Texas, April 29-May 3, with a joint meeting of the Texas Academy of Sciences. The main theme of the meeting will be the potentialities of desert and arid lands, with a symposium or general session Wednesday afternoon, May 2, which will include papers on climatic and vegetational history. Other topics of interest to archaeologists will be taken up in the regular sessions of the Social Sciences Section (Dr. Bertha P. Dutton, Museum of New Mexico, chairman).

VIKING FUND AWARDS — 1950

Medalist in Archaeology
Chosen by
The Society for American Archaeology
DR. EMIL WALTER HAURY

Medalist in General Anthropology
Chosen by
American Anthropological Association
DR. CLYDE KAY KLUCKHOHN

Medalist in Physical Anthropology
Chosen by
American Association of Physical Anthropologists
DR. WILTON MARION KROGMAN

The name Viking Fund is to be officially changed to Wenner-Gren Foundation for Anthropological Research. When necessary legal steps are completed, notice will be given of effective date of change.

SOME RECENT PUBLICATIONS*

The following abbreviations are used in the items cited:

AA	*American Anthropologist*, n.s. Menasha.
AHG	*Antropologia e Historia de Guatemala*. Guatemala.
AMNH-AP	*American Museum of Natural History, Anthropological Papers*. New York.
APS-P	*American Philosophical Society, Proceedings*. Philadelphia.
APS-T	*American Philosophical Society, Transactions*. Philadelphia.
Ar	*Archeology*. Cambridge, Mass.
AR	*Anthropological Records*. Berkeley: University of California.
ASC-B	*Archeological Society of Connecticut, Bulletin*. New Haven.
ASNJ-B	*Archeological Society of New Jersey, Bulletin*. Trenton.
ASNJ-NL	*Archeological Society of New Jersey, News Letter*. Trenton.
BAE-B	*Bureau of American Ethnology Bulletin*. Smithsonian Institution, Washington.
BBAA	*Boletin Bibliográfico de Antropologia Americana*. Mexico, D.F.
BICN	*Boletin de Informaciones Cientificas Nacionales*. Quito: Casa de la Cultura Ecuatoriana.
CIW-CAAH	*Carnegie Institution of Washington, Contributions to American Anthropology and History*. Washington.
CIW-NMAAE	*Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*. Washington.
CIW-P	*Carnegie Institution of Washington, Publications*. Washington.
CNHM-B	*Chicago Natural History Museum, Bulletin*. Chicago.
EG	*Early Georgia*. Athens.
EP	*El Palacio*. Santa Fe.
ESAF-B	*Eastern States Archeological Federation, Bulletin*. Harrisburg.
FiA	*Fieldiana—Anthropology*. Chicago.
FlA	*Florida Anthropologist*. Gainesville.
INAH-A	*Instituto Nacional de Antropologia e Historia, Anales*. Mexico, D.F.
ISAS-J	*Illinois State Archaeological Society, Journal*. Springfield.
KAS-P	*Kroeber Anthropological Society, Publications*. Berkeley.
M	*Man*. London.
MARI-P	*Middle American Research Institute, Publications*. New Orleans: Tulane University.
MARR	*Middle American Research Records*. New Orleans: Tulane University.
Mas	*The Masterkey*. Los Angeles.
MAS-B	*Massachusetts Archaeological Society, Bulletin*. Attleboro.
MoA	*The Missouri Archaeologist*. Columbia.
MS	*Museum Service*. Rochester.
NYAS-T	*New York Academy of Sciences, Transactions, Series 2*. New York.
OIRCS-B	*Ohio Indian Relic Collectors Society, Bulletin*. Columbus.
OSAHQ	*The Ohio State Archaeological and Historical Quarterly*. Columbus.
P	*Plateau*. Flagstaff.
PA	*Pennsylvania Archaeologist*. Philadelphia.
PAC-NL	*Plains Archeological Conference, News Letter*. Salt Lake City.
PMAAE-P	*Peabody Museum of American Archaeology and Ethnology, Papers*. Cambridge.
PMAAE-M	*Peabody Museum of American Archaeology and Ethnology, Memoirs*. Cambridge.
RMEA	*Revista Mexicana de Estudios Antropológicos*. Mexico, D.F.
S	*Science*. Washington.
SA	*Scientific American*. New York.
SAP-J	*Société des Américanistes de Paris, Journal*. Paris.
SCN-M	*Sociedad de Ciencias Naturales, Memorias*. Caracas, Venezuela.
SIS	*Southern Indian Studies*. Chapel Hill.
SJA	*Southwestern Journal of Anthropology*. Albuquerque.
SL	*Southwestern Lore*. Boulder, Colo.
TA	*Tennessee Archaeologist*. Knoxville.
TAPS-B	*Texas Archeological and Paleontological Society, Bulletin*. Lubbock.
TRB	*Tree Ring Bulletin*. Tucson.
UCAS-R	*University of California Archaeological Survey, Report*. Berkeley.
UCPAAE	*University of California, Publications in American Archaeology and Ethnology*. Berkeley.
UKRA	*University of Kentucky Reports in Anthropology*. Lexington.
USD-MN	*University of South Dakota, Museum News*. Vermillion.
UU-AP	*University of Utah, Anthropological Papers*. Salt Lake City.
WA	*Wisconsin Archeologist*. Milwaukee.
WAS-J	*Washington Academy of Sciences, Journal*. Washington.
WVA	*West Virginia Archaeologist*. Moundsville.

* The ASSISTANT EDITORS, as most readers of *American Antiquity* already know, are frequently asked to advise the editor on manuscripts bearing on sites or problems from their respective areas. Also, it is their anonymous editorial chore to gather, sift, and arrange (subject to further revision by the ASSOCIATE EDITOR, who fits material to varying space limitations) the important NOTES AND NEWS feature of each issue.

It should be pointed out that the over 500 titles included in SOME RECENT PUBLICATIONS in this issue were in large measure gathered by these same unsung assistant editors. The editor's contribution has been limited to arrangement and consolidation; also a few titles, not available to the assistants, have been added from publications sent directly to the editor through the courtesy of the publisher or of the author.

GENERAL

Anderson, Edgar and Hugh C. Cutler. "Methods of Popping Corn and their Historical Significance." *SJA*, Vol. 6, No. 3, pp. 303-8. 1950.

Appleton, LeRoy H. *Indian Art of the Americas*. 280 pp., 79 pl. New York. 1950.

Arnold, J. R. and W. F. Libby. *Radiocarbon Dates (to September 1, 1950)* 15 pp. Chicago: Institute for Nuclear Studies, University of Chicago, 1950.

Arnold, J. R. and W. F. Libby. Radiocarbon Dates. *Science*, Vol. 113, No. 2927, pp. 111-20. 1951.

Bryan, Kirk. "Flint Quarries, the Sources of Tools and at the Same Time, the Factories of the American Indians." *PMAAE-P*, Vol. 17, No. 3, 40 pp. 1950.

Canals Frau, Salvador. *Prehistoria de América*. 589 pp. Buenos Aires, 1950.

Carpenter, Edmund S. "The Role of Archaeology in the 19th Century Controversy Between Developmentalism and Degeneration." *PA*, Vol. 20, Nos. 1-2, pp. 5-18. 1950.

Carter, George F. "Plant Evidence for Early Contacts with America." *SJA*, Vol. 6, No. 2, pp. 161-82. 1950.

Chard, Chester S. "Pre-Columbian Trade Between North and South America." *KAS-P*, No. 1, pp. 1-27. 1950.

Collier, Donald. "New radiocarbon method for dating the past." *CNHM-B*, Vol. 22, No. 1, pp. 6-7. 1951.

Cook, Sherburne F. "Physical Analysis as a Method for Investigating Prehistoric Habitation Sites." *UCAS-R*, No. 7, pp. 2-4. 1950.

Daniel, Glyn E. "A Hundred Years of Archaeology." 344 pp. London, 1950.

Ehrich, Robert W. "Some Reflections on Archaeological Interpretations." *AA*, Vol. 52, No. 4, pp. 468-82. 1950.

Flint, Richard Foster. "Late Pleistocene Dates Derived from Radiocarbon Assays." *S*, Vol. 109, No. 2843, p. 636. 1949.

Gates, David M. "Dating of Archaeological Materials by Means of Radioactive Carbon." *SL*, Vol. 16, No. 1, pp. 1-4. 1950.

Gilmore, Raymond M. "The Identification and Value of Mammal Bones from Archaeologic Excavations. *Journal of Mammalogy*, Vol. 30, No. 2, pp. 163-9. Baltimore, 1949.

Harcourt, Raoul d'. *Arts de l'Amérique*. Arts du Monde. 200 pp. Paris, 1948.

Harrington, M. R. "The Magic of Carbon 14." *Mas*, Vol. 25, No. 1, pp. 25-6. 1951.

Heizer, Robert F. "On the Methods of Chemical Analysis of Bone as an Aid to Prehistoric Culture Chronology. *UCAS-R*, No. 7, pp. 10-14. 1950.

Hernández de Alba, Gregorio. "La cerámica: su estudio y clasificaciones." *Universidad del Cauca, Contribuciones del Instituto Etnológico*, No. 2, 31 pp. Popayán, Colombia, 1949.

Hornblower, G. D. "The Origin of Pictorial Art." *M*, No. 51, pp. 2-3. 1951.

Hughes, Jack. "An Experiment in Relative Dating of Archeological Remains by Stream Terraces." *TAPS-B*, Vol. 21, pp. 97-104. 1950.

Jennings, Jesse D. (Editor). "Proceedings of the Sixth Plains Archeological Conference, 1948." *UU-AP*, No. 11, 161 pp. 1950.

Jennings, Jesse D. "Table Top Archaeology." *Ar*, Vol. 3, No. 3, pp. 175-8. 1950.

LaPaz, Lincoln. "Meteoritical Pictographs." *Contributions of the Meteoritical Society*, Vol. 4, No. 2, pp. 122-8. Los Angeles, 1948.

Letoi-Gourhan, André. *Les Fouilles Préhistoriques: Technique et Méthodes*. 88 pp. Paris, 1950.

McKern, W. C. "Practical Tips on Collecting and Surveying." *WA*, Vol. 30, No. 3, pp. 55-62. 1949.

McKern, W. C. "The Purpose and Value of Trait Lists." *WA*, Vol. 31, No. 3, pp. 71-6. 1950.

Renaud, E. B. "Cultural Overlaps and Archaeological Chronology." *SL*, Vol. 15, No. 4, pp. 41-6. 1950.

Renaud, E. B. "The Scientific Value of Stone Artifacts." *SL*, Vol. 16, No. 2, pp. 18-22. 1950.

Stern, Theodore. "The Rubber-Ball Games of the Americas." *American Ethnological Society, Monographs*, Vol. 17, 122 pp. New York, 1950.

Weatherwax, Paul. "The History of Corn." *Scientific Monthly*, Vol. 71, No. 1, pp. 50-60. Lancaster, Pa., 1950.

Willey, Gordon R. "Growth Trends in New World Culture." In: *For the Dean*, pp. 223-47. Santa Fe, 1950.

Wormington, H. M. "The Need for Changes in Terminology Used in Studies of Early Stone Industries." *UU-AP*, No. 11, pp. 26-9. 1950.

Yoder, Hatten S., Jr. "The Jadeite Problem." *American Journal of Science*, Vol. 248, Nos. 4 and 5, pp. 225-48; 312-34. New Haven, 1950.

ARCTIC

Birket-Smith, K. "Nye Fremskridt Inden For Eskimoforskningen." *Fra Nationalmuseets Arbejdsmark*, pp. 81-100. Copenhagen. 1950.

Burgesse, J. A. "Esquimaux in the Saguenay." *Primitive Man*, Vol. 22, Nos. 1-2, pp. 23-32. Washington, 1949.

Bushnell, G. H. S. "Some old Western Eskimo Spear-throwers." *M*, No. 49, p. 121. 1949.

Collins, Henry B. "Excavations at Frobisher Bay, Baffin Island, Northwest Territories." *Annual Report, National Museum of Canada, 1948-1949*, No. 118, pp. 18-43. Ottawa, 1950.

Giddings, J. L. Jr. "Traces of Early Man on the North Bering Sea Coast." *University Museum Bulletin, University of Pennsylvania*, Vol. 14, No. 4, pp. 2-13. Philadelphia, 1950.

Harrington, M. R. "The Huntley Eskimo Collection." *Mas*, Vol. 23, No. 6, pp. 165-73. 1949.

Heinrich, A. "Some Present-Day Acculturation Innovations in a Non-Literate Society." *AA*, Vol. 52, No. 2, pp. 235-42. 1950.

Heizer, Robert F. "Pottery from the Southern Eskimo Region." *APS-P*, Vol. 93, No. 1, pp. 48-56. 1949.

Oswalt, Wendell. "Spruce Borings from the Lower Yukon River, Alaska." *TRB*, Vol. 16, No. 4, pp. 26-30. 1950.

Paterson, T. T. "Eskimo String Figures and their Origin." *Acta Arctica*, Fasc. 3, 98 pp. 1949.

Solecki, Ralph. "Archaeology and Geology in Northwestern Alaska." *Earth Science Digest*, Vol. 4, No. 7, pp. 3-7. 1950.

Solecki, Ralph. "How Man Came to North America." *SA*, Vol. 184, No. 1, pp. 11-15. 1951.

Solecki, Ralph. "New data on the inland Eskimo of Northern Alaska." *WAS-J*, Vol. 40, No. 5, pp. 137-57. 1950.

Thalbitzer, W. "A Note on the Derivation of the word 'Eskimo' (Inuit)." *AA*, Vol. 52, No. 4, Pt. 1, p. 564. 1950.

PACIFIC COAST

Bennyhoff, J. A. "Californian Fish Spears and Harpoons." *AR*, Vol. 9, No. 4, pp. 295-337. 1950.

Borden, Charles E. "Preliminary Report on Archaeological Investigations in the Fraser Delta Region." *Anthropology in British Columbia*, No. 1, pp. 13-27. Victoria, 1950.

Cain, H. Thomas. *Petroglyphs of Central Washington*. 66 pp. Seattle: University of Washington Press, 1950.

Cook, Sherburne F., and A. E. Treganza. "The Quantitative Investigation of Indian Mounds." *UCPAAE*, Vol. 40, No. 5, pp. 223-61. 1950.

Cressman, Luther S. "Archaeological Research in the John Day Region of North Central Oregon." *APS-P*, Vol. 94, No. 4, pp. 369-85. 1950.

Drucker, Philip. "Culture Element Distributions: XXVI: Northwest Coast." *AR*, Vol. 9, No. 3, 294 pp. 1950.

Garth, Thomas R. "A Report on the Second Season's Excavations at Wailatpu." *Pacific Northwest Quarterly*, Vol. 40, No. 4, pp. 295-315. Seattle, 1949.

Gunther, Erna. "The Indian Background of Washington History." *Pacific Northwest Quarterly*, Vol. 51, No. 3, pp. 189-202. Seattle, 1950.

Heizer, Robert F. "Archaeology of CCo-137, the 'Concord Man' site." *UCAS-R*, No. 9, pp. 6-14. 1950.

Heizer, Robert F. "A Cave Burial from Kern County." *UCAS-R*, No. 10, pp. 29-36. 1950.

Heizer, Robert F. "Observations on Early Man in California." *UCAS-R*, No. 7, pp. 5-9. 1950.

Heizer, Robert F. "Observations on Historic Sites and Archaeology in California." *UCAS-R*, No. 9, pp. 1-5. 1950.

Heizer, Robert F., and S. F. Cook. "The Archaeology of Central California: Chemical Analysis of Human Bone from Nine Sites." *AR*, Vol. 12, No. 2, pp. 85-111. 1950.

Inverarity, R. B. *Art of the Northwest Coast*. 243 pp. and 279 illus. Berkeley: University of California Press, 1950.

King, Arden R. "Cattle Point, a Stratified Site in the Southern Northwest Coast Region." *Society for American Archaeology, Memoirs*, No. 7, 94 pp. 1950.

Lathrap, Donald. "A Distinctive Pictograph from the Carrizo Plains, San Luis Obispo County." *UCAS-R*, No. 9, pp. 20-6. 1950.

Laughlin, William S. "Tests for Presence of Blood Group Substance in Skeleton 11-218 (Butte Creek Cave, John Day Region, Oregon)." *APS-P*, Vol. 94, No. 4, pp. 387-9. 1950.

Meighan, Clement W. "Excavations in 16th Century Shellmounds at Drake's Bay, Marin County." *UCAS-R*, No. 9, pp. 27-32. 1950.

Meighan, Clement W. "Observations on the Efficiency of Shovel Archaeology." *UCAS-R*, No. 7, pp. 15-20. 1950.

Mills, John E. "Recent Developments in the Study of Northwestern California Archaeology." *UCAS-R*, No. 7, pp. 21-5. 1950.

Osborne, Douglas, J. L. Shiner, and F. H. H. Roberts, Jr. "River Basin Surveys-State College of Washington Archaeological Excavations in the Lower McNary Reservoir, Oregon." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*. 41 pp. Washington, 1950.

Riddell, F. A. "The Archaeology of Site Ker-74." *UCAS-R*, No. 10, pp. 1-28. 1950.

Sample, L. L. "Trade and Trails in Aboriginal California." *UCAS-R*, No. 8, 30 pp. 1950.

Sewell, J. H. "Archaeological Remains in Central British Columbia." *Anthropology in British Columbia*, No. 1, pp. 28-32. Victoria, 1950.

Shiner, J. L., and F. H. H. Roberts, Jr. "Appraisal of Archaeological Resources of the John Day Reservoir on the Columbia River, Oregon and Washington." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*, 15 pp. Washington, 1950.

Shiner, J. L., and F. H. H. Roberts, Jr. "Appraisal of the Archaeological Resources of the Post Reservoir in Crook County, Oregon." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*, 6 pp. Washington, 1949.

Shiner, J. L., and F. H. H. Roberts Jr. "Appraisal of the Archaeological Resources of Twelve Reservoirs in the Willamette Valley, Oregon." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*, 22 pp. Washington, 1949.

Shiner, J. L., and F. H. H. Roberts, Jr. "Archaeological Resources in the Albeni Falls Reservoir, Northern Idaho." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*, 12 pp. Washington, 1950.

Shiner, J. L., and F. H. H. Roberts, Jr. "Archaeological Resources in the Libby and Katka Reservoirs, Northern Idaho and Northwestern Montana." *Columbia Basin Project, River Basin Surveys, Smithsonian Institution*, 13 pp. Washington, 1950.

Smith, Marian Wesley. "Archaeology of the Columbia-Fraser Region." *Society for American Archaeology, Memoirs*, No. 6, 46 pp. 1950.

Stewart, T. D. "Report on Skeleton From the Butte Creek Cave, John Day River Region, Oregon." *APS-P*, Vol. 94, No. 4, pp. 385-7. 1950.

Treganza, A. E. and others. "An Archaeological Survey of the Yuki Area." *AR*, Vol. 12, No. 3, pp. 113-24. 1950.

Treganza, A. E. and G. S. Malamud. "The Topanga Culture, First Season's Excavation at the Tank Site, 1947." *AR*, Vol. 12, No. 4, pp. 129-57. 1950.

SOUTHWEST

Anonymous. "Our Archaeologists." *El Paso Natural Gas Co., The Pipeliner*, Vol. 13, No. 3, pp. 48-50. El Paso, 1950.

Anonymous. "River Basin Surveys in Colorado, 1948-1949." *SL*, Vol. 16, No. 1, pp. 13-15. 1950.

Ashley, Burton E. "SI O_2 for Archaeologists." *SL*, Vol. 15, No. 4, pp. 51-3. 1950.

Bahti, Thomas N. "A Largo-Gallina Pit House and Two Surface Structures." *EP*, Vol. 56, No. 2, pp. 52-9. 1949.

Baldwin, Gordon C. "Archaeological Survey in Southeastern Utah." *SJA*, Vol. 5, No. 4, pp. 393-404. 1949.

Baldwin, Gordon C. "Archeological Survey of the Lake Mead Area." In: *For the Dean*, pp. 41-9. Santa Fe, 1950.

Brainerd, G. W. "Pecos Conference." *Mas*, Vol. 24, No. 6, pp. 202-03. 1950.

Burgh, Robert F. "A Fremont Basket Maker House in Dinosaur National Monument." *TRB*, Vol. 16, No. 3, pp. 19-20. 1950.

Butcher, Devereux. *Exploring our Prehistoric Indian Ruins*. 64 pp. Washington: National Parks Association, 1950.

Carter, George F. "Plant Evidence for Early Contacts with America." *SJA*, Vol. 6, No. 2, pp. 161-82. 1950.

Colton, Harold S. "Field Methods in Archaeology." *Museum of Northern Arizona, Technical Series*, No. 1, 38 pp. Flagstaff, 1950.

Danson, Edward B., and Harold E. Molde. "Casa Malpais, A Fortified Pueblo Site at Springerville, Arizona." *P*, Vol. 22, No. 4, pp. 61-7. 1950.

Danson, Edward B. "Preliminary Report of the Peabody Museum —Upper Gila Expedition, Reconnaissance Division, 1949." *EP*, Vol. 57, No. 12, pp. 383-91. 1950.

Ferdon, Edwin N., and Erik K. Reed. "A Pit-house Site near Belen, New Mexico." *EP*, Vol. 57, No. 2, pp. 40-1. 1950.

Ferguson, C. W., Jr. "Additional Dates for Nine Mile Canyon, Northeastern Utah." *TRB*, Vol. 16, No. 2, pp. 10-11. 1949.

Hall, E. T., Jr. "Ceramic Traits and the Nature of Culture Contacts between Anasazi and Mogollon." In: *For the Dean*, pp. 63-75. Santa Fe, 1950.

Haury, Emil W. "A Sequence of Great Kivas in the Forestdale Valley, Arizona." In: *For the Dean*, pp. 29-39. Santa Fe, 1950.

Haury, Emil W. *The Stratigraphy and Archaeology of Ventana Cave*. 599 pp. Albuquerque: University of New Mexico Press, 1950.

Hawley, Florence. "Big Kivas, Little Kivas and Moiety Houses in Historical Reconstruction." *SJA*, Vol. 6, No. 3, pp. 286-302. 1950.

Jones, Hester. "Nusbaum Supervises Archaeological Check of Gas Company Construction Area." *EP*, Vol. 57, No. 9, pp. 278-9. 1950.

Judd, Neil M. "Pioneering in Southwestern Archeology." In: *For the Dean*, pp. 11-27. Santa Fe, 1950.

Kidder, A. V. and H. S. and C. B. Cosgrove. "The Pendleton Ruin, Hidalgo Co., New Mexico." *CIW-CAAH*, No. 50, 70 pp. 1949.

Lange, Charles H. "Notes on the Use of Turkeys by Pueblo Indians." *EP*, Vol. 57, No. 7, pp. 204-9. 1950.

Lewis, Thomas H. "Some Artifacts from the Tularosa Basin of New Mexico." *EP*, Vol. 57, No. 7, pp. 198-203. 1950.

McGregor, John C. "Excavation of Cohonina Sites, 1949." *P*, Vol. 22, No. 4, pp. 68-74. 1950.

Martin, Paul S., and John B. Rinaldo. "Sites of the Reserve Phase, Pine Lawn Valley, Western New Mexico." *FiA*, Vol. 38, No. 3, pp. 403-577. 1950.

Martin, Paul S., and John B. Rinaldo. "Turkey Foot Ridge Site, A Mogollon Village, Pine Lawn Valley, Western New Mexico." *FiA*, Vol. 38, No. 2, pp. 237-96. 1950.

O'Bryan, Deric. "Excavations in Mesa Verde National Park, 1947-48." *Medallion Papers*, No. 39, 144 pp. Globe, Arizona, 1950.

Price, William E., Jr. "The Kaibab Formation of Sycamore Canyon." *P*, Vol. 23, No. 1, pp. 11-16. 1950.

Reed, Erik K. "Eastern Central Arizona Archaeology in Relation to the Western Pueblos." *SJA*, Vol. 6, No. 2, pp. 120-38. 1950.

Reed, Erik K. and Dale S. King, ed. *For the Dean: Essays in Anthropology in Honor of Byron Cummings on his 89th Birthday*. 307 pp. Santa Fe: Hohokam Museums Association and the Southwestern Monuments Association, 1950.

Reed, Erik K. "Minerals and Mining in the Pre-Spanish Southwest." *EP*, Vol. 57, No. 10, pp. 308-10. 1950.

Reed, Erik K. "Population Shifts in the Pre-Spanish Southwest." *TAPS-B*, Vol. 21, pp. 90-6. 1950.

Riley, Carroll L. " 'Defensive' Structures in the Hovenweep Monument." *EP*, Vol. 57, No. 11, pp. 339-44. 1950.

Rinaldo, John B. "An Analysis of Culture Change in the Ackmen-Lowry Area." *FiA*, Vol. 36, No. 5, pp. 93-106. 1950.

Rudy, Jack R. and Robert D. Stirland. "An Archeological Reconnaissance in Washington County, Utah." *UU-AP*, No. 9, 66 pp. 1950.

Schulman, Edmund. "Extension of the Durango Chronology." *TRB*, Vol. 16, No. 2, pp. 12-16. 1949.

Schulman, Edmund. "A Dated Beam from Dinosaur National Monument." *TRB*, Vol. 16, No. 3, pp. 18-19. 1950.

Shulman, Edmund. "Miscellaneous Ring Records I (So. Utah and No. Arizona)." *TRB*, Vol. 16, No. 3, p. 21. 1950.

Shutler, Dick, Jr. "The Dry Creek Site: A Pre-Pottery Lithic Horizon in the Verde Valley, Arizona." *P*, Vol. 23, No. 1, pp. 6-10. 1950.

Simpson, Ruth DeEtte. "Tracking the Hohokam." *Mas*, Vol. 24, No. 4, pp. 126-8. 1950.

Sims, Agnes C. *San Cristobal Petroglyphs*. 26 pp. Santa Fe, 1950.

Smiley, Terah L. "Miscellaneous Ring Records, II (Mesa Verde & Forestdale)." *TRB*, Vol. 16, No. 3, pp. 22-3. 1950.

Smiley, Terah L. "Tree Ring Dates from Point of Pines." *TRB*, Vol. 15, No. 3, pp. 20-1. 1949.

Smith, Elmer R. "Utah Anthropology: An Outline of its History." *SL*, Vol. 16, No. 2, pp. 22-33. 1950.

Smith, Watson. "Preliminary Report of the Peabody Museum—Upper Gila Expedition, Pueblo Division, 1949." *EP*, Vol. 57, No. 12, pp. 392-9. 1950.

Stubbs, Stanley. *Bird's Eye View of the Pueblos*. 122 pp. Norman: University of Oklahoma Press, 1950.

Tobin, S. J. "Notes on Site No. 1, Cahone Ruin, Southwestern Colorado." *SL*, Vol. 15, No. 4, pp. 46-50. 1950.

Toulouse, Joseph H. "The Mission of San Gregorio de Abó." *School of American Research, Monograph*, No. 13, 42 pp. 1949.

Tuthill, Carr. "Notes on the Dragoon Complex." In: *For the Dean*, pp. 51-61. Santa Fe, 1950.

U.S. National Park Service. "Prehistory of Man." In: *A Survey of the Recreational Resources of the Colorado River Basin*, pp. 79-101. Washington, 1950.

Watson, Don. *Cliff Dwellings of the Mesa Verde*. Mesa Verde National Park, Colo., 1950.

Wedel, Waldo R. "Notes on Plains-Southwestern Contacts in the Light of Archeology." In: *For the Dean*, pp. 99-116. Santa Fe, 1950.

Wendorf, Fred. "The Flattop Site in the Petrified Forest National Mounment, Arizona." *P*, Vol. 22, No. 3, pp. 43-51. 1950.

Wendorf, Fred. "A Report on the Excavation of a Small Ruin near Point of Pines, East Central Arizona." *University of Arizona, Social Science Bulletin*, No. 19, 150 pp. Tucson, 1950.

Wilson, Eddie W. "The Gourd in the Southwest." *Mas*, Vol. 24, No. 3, pp. 84-8. 1950.

PLAINS

Antevs, Ernst. "Conditions of Deposition and Erosion by Streams in Dry Regions of the Great Plains." *UU-AP*, No. 11, pp. 42-5. 1950.

Antevs, Ernst. "Postglacial Climatic History of the Great Plains and Dating the Records of Man." *UU-AP*, No. 11, pp. 46-50. 1950.

Antevs, Ernst. "Reply to Dr. Benjamin H. Burma." *UU-AP*, No. 11, pp. 56-9. 1950.

Bell, Robert E. "Archeological Excavations at the Harlan Site, Fort Gibson Reservoir, Cherokee County, Oklahoma." *PAC-NL*, Vol. 3, No. 1, pp. 3-15. 1949.

Bliss, Wesley L. "Early and Late Lithic Horizons in the Plains." *UU-AP*, No. 11, pp. 108-16. 1950.

Burma, Benjamin H. "Erosion and Sedimentation in the Great Plains: A Criticism of Dr. Antevs' Conference Papers." *UU-AP*, No. 11, pp. 52-5. 1950.

Forbis, Richard G. "Archaeological Data from the Gates of the Mountain." *Montana State University, Anthropology and Sociology Papers*, No. 1, pp. 1-10. Missoula, 1950.

Gunther, Erna. "The Westward Movement of Some Plains Traits." *AA*, Vol. 52, No. 2, pp. 174-80. 1950.

Gunnerson, James H. "A Technique of Pottery Decoration." *PAC-NL*, Vol. 3, No. 2, pp. 9-10. 1950.

Holder, Preston and Joyce Wike. "The Allen Site (FT-50): Archeological Evidence of an Early Hunter's Camp on Medicine Creek, Frontier County, Nebraska." *UU-AP*, No. 11, pp. 105-7. 1950.

Hughes, Jack. "Archeology and Environment in the Western Great Plains." *UU-AP*, No. 11, pp. 100-4. 1950.

Hurt, Wesley R. *Preliminary Appraisal of the Swanson Site, 39BR16, South Dakota*. Mimeographed report. 22 pp. Vermillion, 1950.

Hurt, Wesley R. "South Dakota Archaeology." (In 8 parts). *USD-MN*, Vol. 11, Nos. 4-10. 1950.

Hurt, Wesley R. "The Swanson Site, BR 16." (In 2 parts). *USD-MN*, Vol. 11, Nos. 10-11, pp. 1-4; 1-8. 1950.

Kivett, Marvin F. "An Archaic Horizon?" *PAC-NL*, Vol. 3, No. 4, pp. 4-7. 1950.

Kivett, Marvin F. "Archeology and Climatic Implications in the Central Plains." *UU-AP*, No. 11, pp. 88-9. 1950.

Krieger, A. D. "Statement of Problems." *UU-AP*, No. 11, pp. 35-9. 1950.

Krieger, A. D. "A Suggested General Sequence in North American Projectile Points." *UU-AP*, No. 11, pp. 117-24. 1950.

Lueninghoener, G. C., C. B. Schultz, and W. D. Frankforter. "The Pleistocene Terraces of the Central Great Plains." Abstract. *UU-AP*, No. 11, p. 60. 1950.

Lugn, A. L. "A Re-Examination of the Terrace Concept." *UU-AP*, No. 11, pp. 61-3. 1950.

Malouf, Carling. "Notes on the Archaeology of the Big Hole Region, Montana." *Montana State University, Anthropology and Sociology Papers*, No. 4. Missoula, 1950.

Newcomb, W. W., Jr. "A Re-examination of the Causes of Plains Warfare." *AA*, Vol. 52, No. 3, pp. 317-30. 1950.

Newman, Marshall T. "The Blond Mandan: a Critical Review of an Old Problem." *SJA*, Vol. 6, No. 3, pp. 255-72. 1950.

Orr, Kenneth G. "The Possibilities of Dating Archaeological Remains by Measuring their Radioactivity." *UU-AP*, No. 11, pp. 78-81. 1950.

Reed, E. C. "Wind Erosion, Loess Deposits, and Ground Water." *UU-AP*, No. 11, pp. 64-6. 1950.

Roberts, Frank H. H., Jr. and W. Duncan Strong. "Round Table Discussion." *UU-AP*, No. 11, pp. 127-50. 1950.

Russell, Richard J. "Some Problems in Pleistocene Climate." *UU-AP*, No. 11, pp. 39-42. 1950.

Schmitt, Karl. "The Lee Site, Gv3, of Garvin County, Oklahoma." *TAPS-B*, Vol. 21, pp. 69-89. 1950.

Schultz, C. B., W. D. Frankforter, and Loren Toohey. "The Pleistocene Mammals of the Great Plains and their Bearing on the Problems of Human Antiquity." Abstract. *UU-AP*, No. 11, p. 70. 1950.

Sears, Paul B. "Forest Sequence and Climatic Changes in Northeastern North America since Early Wisconsin Times." *UU-AP*, No. 11, pp. 67-8. 1950.

Shumate, Maynard. "Archaeology of the Vicinity of Great Falls, Montana." *Montana State University, Anthropology and Sociology Papers*, No. 2, Missoula, 1950.

Smith, Carlyle S. "Climate and Archaeology in Kansas." *UU-AP*, No. 11, pp. 98-9. 1950.

Smith, Carlyle S. "European Trade Material from the Kansas Monument Site." *PAC-NL*, Vol. 3, No. 2, pp. 2-9. 1950.

Smith, Carlyle S. "Fieldwork in Kansas, 1949." *PAC-NL*, Vol. 2, No. 4, pp. 5-6. 1949.

Smith, Carlyle S. "The Pottery from the Kansas Monument Site." *PAC-NL*, Vol. 3, No. 4, pp. 7-9. 1950.

Stephenson, Robert L. "River Basin Surveys in Texas." *PAC-NL*, Vol. 2, No. 4, pp. 8-9. 1949.

Stout, Thompson M. "The Correlation of Pleistocene Deposits and Mammals between North America and Europe." *UU-AP*, No. 11, pp. 71-2. 1950.

Thompson, Otto T. "Archaeological Notes on the Jefferson and Madison Rivers." *Montana State University, Anthropology and Sociology Papers*, No. 3. Missoula, 1950.

Thorp, James. "Soil Studies and Their Implications for Archeology." *UU-AP*, No. 11, pp. 73-7. 1950.

Watson, Virginia. "The Optima Focus of the Panhandle Aspect: Description and Analysis." *TAPS-B*, Vol. 21, pp. 7-68. 1950.

Weakly, Harry E. "Dendrochronology and its Climatic Implications in the Central Plains." *UU-AP*, No. 11, pp. 90-4. 1950.

Wedel, Waldo R. "Climate and Culture: Some Questions." *UU-AP*, No. 11, pp. 85-7. 1950.

Wedel, Waldo R. "Notes on Plains—Southwestern Contacts in the Light of Archeology." In: *For the Dean*, pp. 99-116. Santa Fe, 1950.

Will, George F. "Dendrochronology, Climate, and Prehistory on the Upper Missouri." *UU-AP*, No. 11, pp. 95-7. 1950.

Will, George F. "Vegetal Remains in Northern Plains Archeology." *PAC-NL*, Vol. 3, No. 2, p. 11. 1950.

NORTHERN MISSISSIPPI VALLEY

Adams, Robert McCormick. "Archaeological Investigations in Jefferson County, Missouri." *MoA*, Vol. 11, Nos. 3-4, pp. 1-72. 1949.

Allee, Mollie. "A Theory of the Fisher and Healy Manifestations." *ISAS-J*, Vol. 7, No. 2, pp. 15-16. 1949.

Anderson, Oscar. "Mineralogy, Geology, and American Indian Archaeology Intricately Inter-related." *ISAS-J*, Vol. 6, No. 4, pp. 25-6. 1949.

Anonymous. "Ancient Burial Mound Opened in Delaware County." *OIRCS-B*, No. 23, p. 6. 1950.

Anonymous. "Hopewell Culture Mound Explored by Ross County Historical Society, 1946." *OIRCS-B*, No. 23, pp. 7, 9. 1950.

Baerreis, David A. "Some Comments on Trait Lists and the Hopewellian Culture." *WA*, Vol. 30, No. 4, pp. 65-73. 1949.

Bakken, Charlotte T. "Preliminary Investigations at the Outlet Site." *WA*, Vol. 31, No. 2, pp. 43-70. 1950.

Bluhm, Elaine A. "Woodland Manifestation in the Starved Rock Area." *ISAS-J*, Vol. 7, No. 2, pp. 23-4. 1949.

Bruder, Edgar G. "The Mayville Indian Rock Paintings." *WA*, Vol. 30, No. 4, pp. 73-8. 1949.

Burke, Edgar. "Engraved Shell Gorgets." *ISAS-J*, n.s., Vol. 1, No. 1, pp. 7-17. 1950.

Copeland, Stanley. "The Hudson Mound." *OIRCS-B*, No. 24, pp. 15-16. 1950.

Deuel, Thorne. "Archaeological Survey of Illinois." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 50-1, 59. 1950.

Fay, George E. "Preliminary Report of the University of Missouri Archaeological Expeditions June, July, 1948." *ISAS-J*, Vol. 6, No. 3, pp. 31-3. 1949.

Fecht, William. "Recent Archaeological Discoveries in the Woodriver, Illinois, area." *ISAS-J*, Vol. 6, No. 3, pp. 34-5. 1949.

Fowler, Melvin L. "Archaeological Field Work in White County." *Living Museum*, Vol. 12, No. 4, p. 124. Springfield, Ill., 1950.

Fowler, Melvin L. "The Ethel R. Wilson Site: A Preliminary Report." *ISAS-J*, n.s., Vol. 1, No. 3, pp. 90-4. 1951.

Fowler, Melvin L. "Further Excavations at the Clear Lake Site in Tazewell County: A Progress Report." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 61-2. 1950.

Fowler, Melvin L. "The Schoenbeck Collection." *Living Museum*, Vol. 12, No. 4, pp. 123-4. Springfield, Ill., 1950.

Goslin, Robert M. "Kettle Hill Cave." *OIRCS-B*, No. 23, pp. 2-3. 1950.

Greenman, Emerson F. *Guide to Serpent Mound*. Rev. ed. 18 pp. Ohio State Archaeological and Historical Society, Columbus, 1950.

Griffin, James B. and Albert C. Spaulding. "The Central Mississippi Valley Archaeological Survey Season 1950—A Preliminary Report." *ISAS-J*, n.s., Vol. 1, No. 3, pp. 74-81, 84. 1951.

Grimm, R. E., ed. *Cahokia Brought to Life*. 72 pp., 32 pl. St. Louis, 1940.

Hall, Robert L. "A Style Analysis of Wisconsin Woodland Pottery." *WA*, Vol. 31, No. 1, pp. 1-42. 1950.

Helmen, Vernon R. *Archaeological Survey of Owen County, Indiana*. 49 pp. Indiana Historical Bureau, Indianapolis, 1950.

Hill, Malcolm W. "Use of Boatstones by the American Indians." *ISAS-J*, Vol. 7, No. 3, p. 12. 1950.

Hill, Malcolm W. "Why Right and Left Bevel Points?" *ISAS-J*, Vol. 7, No. 3, p. 12. 1950.

Hurlbut, Irving W. "A History of the Davenport Public Museum." *ISAS-J*, Vol. 6, No. 4, pp. 23-5. 1949.

Johnson, Thorley. "The Armstrong Site, An Upper Mississippi Site at Pepin, Wisconsin." *WA*, Vol. 30, No. 4, pp. 79-86. 1949.

Karsteter, A. E. "Klutts Bluff Cavern." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 41-4. 1950.

Keller, Gordon. "Four Ancient Manifestations in the Starved Rock Area." *ISAS-J*, Vol. 7, No. 3, p. 20. 1950.

McDonald, S. E. "The Crable Site, Fulton County, Illinois." *ISAS-J*, Vol. 7, No. 4, pp. 16-18. 1950.

McKern, W. C. and R. E. Ritzenthaler. "Trait List of the Effigy Mound Aspect." *WA*, Vol. 30, No. 2, pp. 39-48. 1949.

Mairs, O. L. "A Child Burial at Site 46 MS-61." *WVA*, No. 3, pp. 1-4. 1950.

Maxwell, Moreau S. "A Change in the Interpretation of Wisconsin's Prehistory." *Wisconsin Magazine of History*, Vol. 33, No. 4, pp. 427-43. Madison, 1950.

Mayer-Oakes, William. "An Early Culture from Starved Rock, Illinois." *ISAS-J*, Vol. 7, No. 2, pp. 22-3. 1949.

Miner, Horace. "Cave Hollow, An Ozark Bluff-Dweller Site." *Anthropological Papers, Museum of Anthropology, University of Michigan*, No. 3, 12 pp. Ann Arbor, 1950.

Mohrman, Robert and Harold, "The Rock Creek Site in Adams County, Illinois." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 57-9. 1950.

Morris, Dan. "You Can Still Find Them." *ISAS-J*, Vol. 7, No. 1, pp. 1-3, 15. 1949.

Morris, Dan. "You Can Still Find More of Them." *ISAS-J*, n.s., Vol. 1, No. 3, pp. 85-9, 96. 1951.

Pasco, G. L., and R. E. Ritzenthaler. "Copper Discs in Wisconsin." *WA*, Vol. 30, No. 3, pp. 51-2; No. 4, pp. 63-4. 1949.

Reed, Jim and Melvin L. Fowler. "Dentalium Shell Beads from an Illinois Mound." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 55-6. 1950.

Ringeisen, Joseph, Jr. "The Broken Perforations on Birdstones." *WA*, Vol. 30, No. 3, pp. 53-4. 1949.

Ritzenthaler, Robert E. "Tie-ups Between Prehistoric Cultures and Historic Indian Tribes in Wisconsin." *WA*, Vol. 30, No. 1, pp. 36-8. 1949.

Roberts, Frank H. H., Jr. "River Basin Archeology in the Morgantown Locks Area, West Virginia." *WVA*, No. 3, pp. 16-17. 1950.

Schulman, Albert. "The Toledo Mound: A Preliminary Report." *Northwest Ohio Quarterly*, Vol. 21, pp. 169-75. 1948-9.

Smith, S. Winifred. "A Survey of Publications in Ohio History, Archaeology, and Natural History, August 1949-July 1950." *OSAHQ*, Vol. 59, No. 4, pp. 419-37. 1950.

Solecki, Ralph. "A Note on Grooved Whetstones in the Adena Culture." *WVA*, No. 3, pp. 11-13. 1950.

Solecki, Ralph. "Round Bottom, A Fort Ancient Site on the Ohio." *WVA*, No. 3, pp. 5-8. 1950.

Spier, Robert F. G. "Index to the Missouri Archaeologist." *MoA*, Vol. 12, No. 2, pp. 1-8. 1950.

Stubbs, Francis L. "A Preliminary Report on the Mill Creek Area of Andrew County, Missouri." *MoA*, Vol. 12, No. 1, pp. 1-46. 1950.

Swartze, Everett W. "Second Note on the Lakin Tablets." *WVA*, No. 3, pp. 19-21. 1950.

Taylor, Herbert C., Jr. "Comments on West Texas Pictographs." *ISAS-J*, n.s., Vol. 1, No. 3, pp. 67-73. 1951.

Titterington, Paul. "Some Non-Pottery Sites in the St. Louis Area." *ISAS-J*, n.s., Vol. 1, No. 1, pp. 18-31. 1950.

Wadlow, Walter L. "A Version of Illinois Hopewell." *ISAS-J*, Vol. 6, No. 4, pp. 30-1. 1949.

Wertz, Charles V. "Ancient Man and His Works in and Around Scioto County." *OIRCS-B*, No. 24, pp. 20-9. 1950.

Whiteford, A. H. "A Report on the Outlet Site on Lake Monona." *WA*, Vol. 30, No. 1, pp. 22-35. 1949.

Wilford, Lloyd A. "The Prehistoric Indians of Minnesota: Some Mounds of the Rainy River Aspect." *Minnesota History*, Vol. 31, No. 3, pp. 163-71. 1950.

Young, T. Hugh. "Boatstones — Prehistoric Art of No Limited Degree." *ISAS-J*, n.s., Vol. 1, No. 2, pp. 35-40. 1950.

Young, T. Hugh. "A Study of Stone Graves of Middle Tennessee." *ISAS-J*, Vol. 6, No. 3, pp. 7-12. 1949.

NORTHEAST

Blaker, Margaret C. "Pottery Types from the Townsend Site, Lewes, Delaware." *ESAF-B*, No. 9, p. 11. 1950.

Bullen, Ripley P. "The Johnson's Spring Site." *MAS-B*, Vol. 11, No. 2, pp. 37-45. 1950.

Carpenter, Edmund S. "The Brock Site." *PA*, Vol. 19, Nos. 3-4, pp. 69-77. 1949.

Carpenter, Edmund S. "Four Hopewellian Tumuli in Western New York." *WAS-J*, Vol. 40, No. 7, pp. 209-16. 1950.

Carpenter, Edmund S. "The Spartansburg Cairns." *PA*, Vol. 20, Nos. 1-2, pp. 40-6. 1950.

Cross, Dorothy, and Donald Dilatush. "The Allinson Site." *ASNJ-B*, No. 3, pp. 9-12. 1950.

Cross, Dorothy. "Mashipacong Island Excavations." *ASNJ-B*, No. 3, pp. 6-9. 1950.

Dunn, Gerald C. and William S. Fowler. "An Indian Campsite on Cobbosecontee Stream." *MAS-B*, Vol. 12, No. 1, pp. 1-8. 1950.

Essington, Joseph H. "The Modern Life of an Antiquity." *ESAF-B*, No. 9, p. 8. 1950.

Farver, Sam S. "A Stone Pendant from Lebanon County." *PA*, Vol. 19, Nos. 3-4, pp. 82-3. 1949.

Fowler, William S. and Herbert A. Luther. "The Potter Pond Site." *MAS-B*, Vol. 11, No. 4, pp. 91-102. 1950.

Fowler, William S. "Stone Importation in Prehistoric Massachusetts." *MAS-B*, Vol. 11, No. 2, pp. 29-36. 1950.

Fowler, William S. "Typology of the Heard Pond Site." *MAS-B*, Vol. 11, No. 3, pp. 74-82. 1950.

Franke, Walter E. "A Unique Find." *MAS-B*, Vol. 11, No. 2, pp. 17-18. 1950.

Gookin, Warner F. "The Pilgrims as Archaeologists." *MAS-B*, Vol. 11, No. 2, pp. 19-21. 1950.

Harrington, J. C. "Archeological Projects at Historic Sites in the National Park System." *ESAF-B*, No. 9, p. 9. 1950.

Holland, C. G. "Results of Excavating a Rockshelter in Albemarle County, Virginia." *ESAF-B*, No. 9, p. 8. 1950.

Hornblower, Henry, II. "Pilgrim Sites in the Old Colony Area." *ESAF-B*, No. 9, pp. 9-10. 1950.

Howe, J. V. "The Howe Iron Sites of Mecklenburg County." *ESAF-B*, No. 9, p. 8, 1950.

Knowles, Nathaniel. "Whiteside Excavations." *ASNJ-B*, No. 3, pp. 12-13. 1950.

Mason, J. Alden. "Pottery." Editorial. *ASNJ-NL*, No. 22, p. 1. 1950.

Miller, Carl F. "Synthesising Historical and Archeological Methods (at Jamestown Island, Virginia)." *ESAF-B*, No. 9, p. 9. 1950.

Naylor, M. Frances. "An Inscription by Bartholomew S. Calvin." *ASNJ-B*, No. 3, p. 1. 1950.

Otis, Leo D. "The Stones of Stone Age New England." *MAS-B*, Vol. 11, No. 2, pp. 45-7. 1950.

Phelps, Mason M. "Titicut Indian Burials—A Soliloquy." *MAS-B*, Vol. 11, No. 2, pp. 21-2. 1950.

Ritchie, William A. "Indian History of New York State, Part I: Pre-Iroquoian Cultures." *Educational Leaflet Series, New York State Museum*, No. 6, pp. 1-13. Albany, 1950.

Ritchie, William A. "The Present Status of Ceramic Typology in New York State." *ESAF-B*, No. 9, p. 10. 1950.

Ritchie, William A. "The Problem of Iroquois Origins." *MS*. 1950.

Ritchie, William A. "Recent Excavations in the Mohawk Valley and Their Bearing on Owasco-Iroquois Relationships." *ESAF-B*, No. 9, pp. 7-8. 1950.

Robbins, Maurice. "Historical Approach to Titicut." *MAS-B*, Vol. 11, No. 3, pp. 48-73. 1950.

Roberts, Frank H. H., Jr. "Archeology and the Federal River Basin Program." *ESAF-B*, No. 9, pp. 8-9. 1950.

Robertson, G. Alexander. "Exploration of Elk Garden Indian Burial Cave." *ESAF-B*, No. 9, p. 7. 1950.

Smith, Benjamin L. "A Report of the Artifact Classification Committee." *MAS-B*, Vol. 11, No. 4, pp. 83-90. 1950.

Smith, Benjamin L. "Some Aspects of the Use of Red Ochre in Prehistoric Burials." *MAS-B*, Vol. 11, No. 2, pp. 22-8. 1950.

Smith, Carlyle S. "The Archaeology of Coastal New York." *AMNH-AP*, Vol. 43, Pt. 2, pp. 97-200. 1950.

Solecki, Ralph. "The Archeological Position of Historic Fort Corchaug, L.I. and its Relation to Contemporary Forts." *ASC-B*, No. 24, pp. 3-40. 1950.

Swauger, James L. "Carnegie Museum Program for Archeological Study in Western Pennsylvania." *PA*, Vol. 20, Nos. 1-2, pp. 31-2. 1950.

Tantaquidgeon, Gladys. "Delaware Indian Art Designs." *PA*, Vol. 20, Nos. 1-2, pp. 24-30. 1950.

Van Stone, James W. "Fortified Houses in Western Pennsylvania." *PA*, Vol. 20, Nos. 1-2, pp. 19-23. 1950.

Vidal, Federico S., Charles I. Slade, and Edward E. Hunt, Jr. "Four Indian Burials at Hyannis, Mass." *MAS-B*, Vol. 12, No. 1, pp. 8-10. 1950.

Wallace, Anthony F. C. "Some Psychological Characteristics of The Delaware Indians During the 17th and 18th Centuries." *PA*, Vol. 20, Nos. 1-2, pp. 33-9. 1950.

Wallace, Paul A. W. "Mapping The Indian Paths of Pennsylvania." *PA*, Vol. 19, Nos. 3-4, pp. 84-5. 1949.

Witthoft, John. "The Cataloging of Archeological Specimens." *PA*, Vol. 19, Nos. 3-4, pp. 61-3. 1949.

Witthoft, John. "The History and Present Status of Pennsylvania Archeology." *APS-P*, Vol. 94, No. 3, pp. 301-7. 1950.

Witthoft, John. "Pottery Types of the Lower Susquehanna Valley." *ESAF-B*, No. 9, pp. 10-11. 1950.

Witthoft, John and Sam S. Farver. "A Lancaster County Pictograph." *PA*, Vol. 19, Nos. 3-4, pp. 78-81. 1949.

Wray, Charles F. "The Adams Site—An Early Historic Seneca Site in Western New York." *ESAF-B*, No. 9, p. 10. 1950.

SOUTHEAST

Anonymous. "Copper Ceremonial Axes." *TA*, Vol. 6, No. 2, pp. 20-1. 1950.

Anonymous. "The Cross Symbol." *TA*, Vol. 6, No. 1, pp. 3-5. 1950.

Anonymous. "Indian Dice." *TA*, Vol. 6, No. 1, pp. 6-7. 1950.

Anonymous. "Quartz, Chalcedony, Flint." *TA*, Vol. 6, No. 1, pp. 7-8. 1950.

Anonymous. "The Spider Symbol." *TA*, Vol. 6, No. 1, pp. 8-9. 1950.

Armistead, W. J. "An Indian Stone Saw." *FIA*, Vol. 2, Nos. 3-4, pp. 47-8. 1950.

Bullen, Ripley P. "An Archeological Survey of the Chattahoochee River Valley in Florida." *WAS-J*, Vol. 40, pp. 101-25. 1950.

Bullen, Ripley P. "Tests at the Whittaker Site, Sarasota, Florida." *FIA*, Vol. 3, Nos. 1-2, pp. 21-30. 1950.

Bullen, Ripley P. "The Woodward Site." *FIA*, Vol. 2, Nos. 3-4, pp. 49-64. 1950.

Caldwell, Joseph R. "A Preliminary Report on Excavations in the Allatoona Reservoir." *EG*, Vol. 1, No. 1, pp. 5-21. 1950.

Cotter, John L. "The Miller Pottery Types in Review." *SIS*, Vol. 2, No. 1, pp. 25-9. 1950.

Curry, Hilda J. "Negative Painted Pottery of the Angel Mounds Site." *Indiana University Publications in Anthropology and Linguistics, Memoirs*, No. 5, pp. 35-90. Baltimore, 1950.

Essington, Joseph H. "The Modern Life of an Antiquity." *ESAF-B*, No. 9, p. 8. 1950.

Goggin, John M. "Cultural Occupation at Goodland Point, Florida." *Fla*, Vol. 2, Nos. 3-4, pp. 65-91. 1950.

Goggin, John M. "Florida Archeology—1950." *FIA*, Vol. 3, Nos. 1-2, pp. 9-20. 1950.

Griffin, John W. "An Archeologist at Fort Gadsden." *The Florida Historical Quarterly*, Vol. 28, pp. 255-61. Jacksonville, 1950.

Griffin, John W. "Notes on the Archeology of Useppa Island." *FIA*, Vol. 2, Nos. 3-4, pp. 92-3. 1950.

Griffin, John W. and Ripley P. Bullen. "The Safety Harbor Site, Pinellas County, Florida." *Florida Anthropological Society, Publications*, No. 2, 42 pp. Gainesville, 1950.

Harrington, J. C. "Archeological Explorations at Fort Raleigh National Historic Site." *North Carolina Historical Review*, Vol. 26, No. 2, pp. 127-49. Raleigh, 1949.

Harris, Corra. "A Sketch of the Pine Log Indian Cave." *EG*, Vol. 1, No. 1, pp. 41-2. 1950.

Hill, Malcolm W. "Cut-Off Tools." *TA*, Vol. 6, No. 2, p. 17. 1950.

Hill, Malcolm W. "Evidence in Stone." *TA*, Vol. 6, No. 2, p. 17. 1950.

Hill, Malcolm W. "Stone Meat Choppers and Butcher Knives of the American Indian." *TA*, Vol. 6, No. 1, pp. 1-2. 1950.

Kelly, A. R. "Changes in Bases of Subsistence among Prehistoric Georgia Populations." *Short Contributions to the Geology, Geography, and Archaeology of Georgia, Georgia Geological Survey, Bulletin*, No. 56, pp. 154-60. Atlanta, 1950.

Kelly, A. R. "An Early Flint Industry in Southwest Georgia." *Short Contributions to the Geology, Geography, and Archeology of Georgia. Georgia Geological Survey, Bulletin*, No. 56, pp. 146-53. Atlanta, 1950.

Kelly, A. R. "Survey of the Lower Flint and Chattahoochee Rivers." *EG*, Vol. 1, No. 1, pp. 27-33. 1950.

Kelly, A. R. "What Are Artifacts?" *EG*, Vol. 1, No. 1, p. 3. 1950.

Patterson, Wayne. "Notes on the Exploration of the Bull Creek Site, Columbus, Georgia." *EG*, Vol. 1, No. 1, pp. 34-40. 1950.

Rouse, Irving. "The Organization and Aims of the Eastern States Archeological Federation." *News Letter of the Archaeological Society of North Carolina*, No. 22, pp. 1-3. Chapel Hill, 1950.

Rouse, Irving. "Vero and Melbourne Man: A Cultural and Chronological Interpretation." *NYAS-T*, Vol. 12, No. 7, pp. 220-4. 1950.

Schmitt, Karl. "The Lee Site, Gv3, of Garvin County, Oklahoma." *TAPS-B*, Vol. 21, pp. 69-89. 1950.

Schmitt, Karl. "Two Creek Pottery Vessels from Oklahoma." *FIA*, Vol. 3, Nos. 1-2, pp. 3-8. 1950.

Sears, William. "Kolomoki." EG, Vol. 1, No. 1, pp. 22-5. 1950.

Smith, Hale G. "The First Floridians." *Florida Highways*, March. Winter Garden, Fla., 1950.

Stack, Guy. "About Arrowheads." *TA*, Vol. 6, No. 2, pp. 15-16. 1950.

Watson, Virginia. "The Wulfing Plates, Products of Prehistoric Americans." *Washington University Studies, New Series, Social and Philosophical Sciences*, No. 8. St. Louis, 1950.

Webb, William S. "Carlson-Annis Mound, Site 5, Butler County, Kentucky." *UKRA*, Vol. 7, No. 4, pp. 267-354. 1950.

Webb, William S. "The Read Shell Midden, Site 10, Butler County, Kentucky." *UKRA*, Vol. 7, No. 5, pp. 357-401. 1950.

Willey, Gordon R. "Crystal River, Florida; A 1949 Visit." *FIA*, Vol. 2, Nos. 3-4, pp. 41-6. 1950.

MIDDLE AMERICA

Acosta, Jorge. "El pectoral de jade de Monte Alban." *INAH-A*, Vol. 3, pp. 17-25. 1949.

Anderson, Arthur J. O. and Charles E. Dibble. "Florentine Codex." General History of the Things of New Spain by Fray Bernadino de Sahagun. Book I—The Gods. Translated from the Aztec into English, with Notes and Illustrations. In Thirteen Parts. Part II. *School of American Research, Monographs*, No. 14, Part II, 46 pp. Santa Fe, 1950.

Armillas, Pedro. "Visita a Copan." *Cuadernos Americanos*, Vol. 9, No. 4, pp. 143-52. Mexico, 1950.

Aveleyra, Luis. *Prehistoria de Mexico*. Mexico, 1950.

Barlow, Robert H. "El códice Azcatitlan." *SAP-J*, Vol. 38, pp. 101-35. 1949.

Barlow, Robert H. "Las conquistas de Moteczuma Xocoyotzin." *Memorias de la Academia Mexicana de la Historia*, Vol. 8, pp. 159-72. 1949.

Barlow, Robert H. "The Extent of the Empire of the Culhua Mexica." *Ibero-Americana*, No. 28, 141 pp. Berkeley, 1949.

Barlow, Robert H. "An Incised Bone from Huexotla." *Meso-American Notes*, Vol. 1, p. 28. Mexico, 1950.

Barrera Vasquez, Alfredo, and Sylvanus G. Morley. "The Maya Chronicles." *CIW-CAAH*, Vol. 10, No. 48, 85 pp. 1949.

Bernal, Ignacio. *La cerámica de Monte Alban IIIa*. 162 pp. Mexico, 1949.

Bernal, Ignacio. "La cerámica grabada de Monte Alban." *INAH-A*, Vol. 3, pp. 59-77. 1949.

Bernal, Ignacio. "Compendio de arte mesoamericana." *Enciclopedia Mexicana de Arte*, No. 7, 52 pp. Mexico, 1950.

Bernal, Ignacio. "Exploraciones en Coixtlahuaca, Oax." *RMEA*, Vol. 10, pp. 5-76. 1949.

Blom, Frans. "Ciudades misteriosas en la selva lacandona." *El Nacional*, p. 6. Mexico, 1949.

Blom, Frans. "Noches en la selva lacandona; Extracto del diario de F. Blom." *Prometheus*, Vol. 1, No. 3. 1949.

Boggs, Stanley H. "Archeological Excavations in El Salvador." In: *For the Dean*, pp. 259-76. Santa Fe, 1950.

Boggs, Stanley H. "Tlaloc Incensarios in the Baratta Collection, El Salvador." *CIW-NMAAE*, Vol. 4, No. 94, pp. 36-45. 1949.

Borhegyi, Stephen F. de. "Rim-headed Vessels and Cone-shaped Effigy Prongs of the Pre-classic Period at Kaminaljuyu, Guatemala." *CIW-NMAAE*, Vol. 4, No. 97, pp. 60-80. 1950.

Borohegyi, Stephen F. de. "Tlaloc Effigy Jars from the Guatemala National Museum." *CIW-NMAAE*, Vol. 4, No. 96, pp. 55-9. 1950.

Burland, Cottie A. "The Blow-gun in Pre-Spanish Mexico." *Ethnos*, Vol. 14, Nos. 2-4, pp. 101-4. Stockholm, 1949.

Burland, Cottie A. *The Four Directions of Time, an Account of Page One of Codex Fejervary Mayer*. 12 pp. Santa Fe, Museum of Navajo Ceremonial Art, 1950.

Burland, Cottie A. "Mexican Deluge Legends." *Atlantean Research*, Vol. 2, No. 4, pp. 55-8. London, 1949.

Carcer, Mariano de. "Ejemplares de arte plumario mexicano y una falsificacion del Lienzo de Tlaxcala." *RMEA*, Vol. 10, pp. 99-113. 1949.

Carrión Cachot, Rebeca. "La Cultura Chavín; dos nuevas colonias: Kuntur Wasi y Ancón." *Revista del Museo Nacional de Antropología y Arqueología*, Vol. 2, No. 1, pp. 99-172. Lima.

Covarrubias, Miguel. "Tlatilco; El arte y la cultura preclasica del Valle de Mexico." *Cuadernos Americanos*, Vol. 9, No. 3, pp. 149-62. Mexico, 1950.

Davila Garibi, J. Ignacio. *La escritura del idioma nahuatl a través de los siglos*. 185 pp. Mexico, 1948.

Espejo, Antonieta, James B. Griffin, *et al*. "Tlatelolco a través de los tiempos, XI." *Memorias de la Academia de la Historia*, Vol. 9, No. 1, pp. 1-118. Mexico, 1950.

Estrada Balmori, Elma. "Funeraria en Chupícuaro, Guanajuato." *INAH-A*, Vol. 3, pp. 79-84. 1949.

Faulhaber, Johanna. "Los oseos de la Huasteca." *RMEA*, Vol. 10, pp. 77-98. 1949.

Fuente, J. de la. "Documentos para la etnografía e historia zapotecas." *INAH-A*, Vol. 3, pp. 175-97. 1949.

Fuente, J. de la. "Yalalag, una villa zapoteca serrana." *Museo Nacional de Antropología, Séries Científica*, Vol. 1, 382 pp. Mexico, 1949.

Garcia Payon, Jose. "De la calidad y deberes de los embajadores entre los azteca." *Uni-ver*, Vol. 2, pp. 357-68. Jalapa, Ver., 1950.

Garcia Payon, Jose. "Una palma in situ." *RMEA*, Vol. 10, pp. 121-4. 1949.

Gifford, E. W. "Surface Archaeology of Ixtlan del Rio, Nayarit." *UCPAAE*, Vol. 43, No. 2, pp. 183-301. 1950.

Healey, Giles G. "The Lacanja Valley." *Ar*, Vol. 3, No. 1, pp. 12-15. 1950.

Hewes, Gordon W. "Some Lake Cuitzeo Sites, Michoacan, Mexico." *Mas*, Vol. 24, No. 6, pp. 179-82. 1950.

Hunter, Milton R. and Thomas S. Ferguson. *Ancient America and the Book of Mormon*. 450 pp. Oakland, 1950.

Kidder, A .V. "The Archaeological Importance of Guatemala." *Annual Report of the Smithsonion Institution . . . 1949, Publication* 3996, pp. 349-58. 1950.

Kidder, A. V. "Certain Archaeological Specimens from Guatemala, II." *CIW-NMAAE*, No. 95, pp. 46-54. 1950.

Kirchhoff, Paul. "The Mexican Calendar and the Founding of Tenochtitlan-Tlatelolco." *NYAS-T*, Vol. 12, No. 4, pp. 126-32. 1950.

Krickeberg, Walter. *Felsplastik und Felsbilder bei den Kulturvölkern Altamericas, mit besonderer Berücksichtigung Mexicos*. Band 1: *Die Andenländer*; Band 2: *Die Felsentempel in Mexiko*. Berlin, 1949.

Krieger, Alex D. and Jack T. Hughes. *Archaeological Salvage in the Falcon Reservoir Area: Progress Report No. 1*. Mimeographed. Dept. of Anthropology, University of Texas, Austin, 1950.

Lewis, Oscar. "Aspects of Land Tenure and Economics in a Mexican Village." *MARR*, Vol. 1, No. 13, 16 pp., 1949.

Long, Boaz, ed. *Morleyana: A Collection of Writings in Memoriam, Sylvanus Griswold Morley, 1883-1948*. 268 pp. Santa Fe, 1950.

Lothrop, Samuel K. "Archaeology of Southern Veraguas, Panama." *PMAAE-M*, Vol. 9, No. 3, 116 pp. 1950.

Lothrop, Samuel K. *An Exhibition: Ancient American Gold and Jade*. 23 pp. The Taft Museum, Cincinnati. 1950.

Melgarejo Vivanco, Jose L. *Historia de Veracruz (Epoca prehispanica)*. 518 pp. Jalapa, Mexico, 1950.

Malgarejo Vivanco, Jose L. "Toponomía de los municipios veracruzanos." *Editiv*, No. 10, p. 45. Jalapa, 1950.

Noguera, Eduardo. "El horizonte tolteca-chichimeca." *Enciclopedia Mexicana de Arte*, No. 4. Mexico, 1950.

Noguera, Eduardo. "Nuevos rasgos caracteristicos encontrados en Xochicalco." *RMEA*, Vol. 10, pp. 115-9. 1949.

Osborne, Lilly de Jongh. "Apuntes sobre la indumentaría indígena de Guatemala." *AHG*, Vol. 1, No. 2, pp. 49-57. 1949.

Peterson, Frederick A. "Notes on Coatlinchan Ceramics." *Mesoamerican Notes*, Vol. 1, pp. 29-33. 1950.

Popol Vuh, the Sacred Book of the Ancient Quiche Maya. Translated by Adrian Recinos. English Version by Delia Goetz and Sylvanus G. Morley. 267 pp. Norman, 1950.

Roys, Ralph L. "Guide to the Codex Perez." *CIW-CAAH*, Vol. 10, No. 49, pp. 87-106. 1949.

Roys, Ralph L. "The Prophecies for the Maya Tuns or Years in the Books of Chilam Balam of Tizimin and Mani." *CIW-CAAH*, Vol. 10, No. 51, pp. 153-86. 1949.

Ruppert, Karl. "Gallery-Patio Type Structures at Chichen Itza." In: *For the Dean*, pp. 249-58. Santa Fe, 1950.

Shook, Edwin M. "Historia arqueológica del puerto de San José, Guatemala." *AHG*, Vol. 1, No. 2, pp. 3-22. 1949.

Shook, Edwin M. "Some Recent Aspects of Mayan Civilization and Maize Culture on the Pacific Coast of Guatemala." *Iowa State College, Research Bulletin*, No. 371, 8 pp. 1949.

Smith, A. Ledyard. "Uaxactun, Guatemala: Excavations of 1931-1937." *CIW-P*, No. 588, 108 pp. 1950.

Smith, Robert S. "Cerámica elaborada sin torno, Chinautla, Guatemala." *AHG*, Vol. 1, No. 2, pp. 58-61. 1949.

Sáenz, Wilfrido du. "Cerámica arqueológica de San Cristobal Ecatepec." *INAH-A*, Vol. 3, pp. 27-57. 1949.

Solís Alcalá, Ermilo. *Códice Perez. Traducción libre del maya al castellano*. 571 pp. Merida, Yucatan. 1949.

Sotomayor, Arturo. *Dos sepulchros en Bonampak*. 165 pp. Mexico, 1949.

Tezozomoc, Fernando Alvarado. *Crónica Mexicayotl*. Translated from Aztec by Adrian Leon. 189 pp. Mexico, 1949.

Thompson, J. Eric S. "Maya Hieroglyphic Writing: Introduction." *CIW-P*, No. 589, 347 pp. Washington, 1950.

Thompson, J. Eric S. "Sylvanus Griswold Morley, 1883-1948." *AA*, Vol. 51, No. 2, pp. 293-7. 1949.

Thompson, J. Eric S. "Tentativa de reconocimiento en el area maya meridional." *AHG*, Vol. 1, No. 2, pp. 23-48. 1949.

Villagra Caleti, Agustín. "Bonampak, la ciudad de los muros pintados." *INAH-A*, Vol. 3 (Supplement), 31 pp. 1949.

Vivante, Armando. "Juego-culto-religión." *Revista del Instituto de Antropología*, Vol. 4, pp. 269-308. Tucumán, 1949.

Wauchope, Robert. "A Tentative Sequence of Pre-classic Ceramics in Middle America." *MARR*, Vol. 1, No. 14, 40 pp. 1950.

West, Robert C. and Pedro Armillas. "Las chinampas de México, Poesía y realidad de los jardines flotantes." *Cuadernos Americanos*, Vol. 9, No. 2, pp. 165-82. Mexico, 1950.

Winning, Hasso von. "Animal Figurines on Wheels from Ancient Mexico." *Man*, Vol. 24, No. 5, pp. 154-9. 1950.

WESTERN SOUTH AMERICA

Araujo, Emilio. "Exposición de los especímenes más importantes del Museo Arqueológico de la Universidad del Cuzco." *Revista del Instituto y Museo Arqueológico*, Segunda época, Año 7, No. 12, pp. 165-6. Cuzco, 1948.

Arauz, Julio. "Continuación del platino en La Tolita." *BICN*, Vol. 2, No. 17, pp. 7-12. 1949.

Arauz, Julio. "Joyas de Esmeraldas." *BICN*, Vol. 2, Nos. 18-19, pp. 7-14. 1949.

Arauz, Julio. "El platino en La Tolita." *BICN*, Vol. 2, Nos. 15-16, pp. 7-11. 1949.

Arauz, Julio. "Reflexiones sobre la prehistoria esmeraldeña." *BICN*, Vol. 3, Nos. 20-21, pp. 8-12. 1949.

Arauz, Julio. "Siguen las miniaturas de oro." *BICN*, Vol. 2, Nos. 13-14, pp. 7-17. 1948.

Bennett, Wendell C. "The Gallinazo Group, Viru Valley, Peru." *Yale University Publications in Anthropology*, No. 43, 127 pp. New Haven, 1950.

Bernedo Málago, Leónidas. *La cultura puquina, o prehistoria de la provincia de Arequipa*. 144 pp. Lima, 1949.

Biocca, Ettore. "I 'sambaquis' del litorale Paulista (Brasile)." *Rivista di Antropologia*, Vol. 35, pp. 335-48. Rome, 1944-47.

Brainerd, George W. "A Peruvian Whistling Jar." *Man*, Vol. 25, No. 1, pp. 18-22. 1951.

Bühler-Oppenheim, Kristin, and Alfred Bühler-Oppenheim. "Die Textiliensammlung Fritz Iklé-Huber im Museum für Völkerkunde und Schweizerischen Museum für Volkskunde, Basel." *Denkschriften der Schweizerischen Naturforschenden Gesellschaft*, Vol. 78, No. 2, pp. 83-268. Zurich, 1948.

Bushnell, G. H. S. "Ancient Peoples of the Andes." *Penguin Books, Science News*, No. 13, pp. 58-86. Harmondsworth, 1949.

Carrión Cachot, Rebeca. *Paracas Cultural Elements*. 62 pp. Lima, 1949.

Cornely, F. L. "Algunas cerámicas con influencia incaica encontradas en el Valle de Elqui." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 2-11. La Serena, Chile, 1949.

Cornely, F. L. "Viaje arqueológico a Huentelauquén." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 17-19. La Serena, Chile, 1949.

Cossío del Pomar, Felipe. "El arte de Parakas." *Cuadernos Americanos*, Vol. 43, No. 1, pp. 139-57. México, 1949.

Costales Samaniego, Alfredo. "El Dr. Juan Félix Proaño y la arqueología riobambeña." *BICN*, Vol. 2, No. 17, pp. 52-8. 1949.

Costas Arguedas, José-Felipe. "Descripción de algunos ceramios Yampara (Chuquisaca, Bolivia)." *Revista del Instituto de Antropología*, Vol. 4, pp. 325-9. Tucumán, 1949.

Cruxent, José M. "Pinturas rupestres en el Carmen, en el Río Parguaza, Estado Bolívar, Venezuela." *Acta Venezolana*, Vol. 2, Nos. 1-4, pp. 83-90. Carácas, 1946-47.

Cruxent, José M. "Ubicación de un paradero arqueológico en las inmediaciones del vecindario de la Puerta de Bobare, Depto. Iribarren." *Acta Venezolana*, Vol. 2, Nos. 1-4, pp. 147-50. Carácas, 1946-47.

Cruxent, José M. and Celso Fortoul. "Esquema para el estudio de la tecnología alfarera primitiva." *Memoria de la Sociedad de Ciencias Naturales La Salle*, Año 9, No. 23, pp. 31-4. Carácas, 1949.

Díaz, Emma, and Lida Giménez. "Material para servir a la arqueología de Jujuy." *Revista del Instituto de Antropología*, Vol. 4, pp. 225-36. Tucumán, 1949.

Dupouy, Walter and José M. Cruxent. "Reconocimiento arqueológico en las Minas de los Teques, Estado Miranda, Venezuela." *Acta Venezolana*, Vol. 2, Nos. 1-4, pp. 46-82. Carácas, 1946-47.

Duque Gómez, Luís. "Introducción al estudio del arte indígena colombiano." *Cuadernos Hispanoamericanos*, No. 4, pp. 161-9. Madrid, 1948.

Espejo Núñez, Teófilo. "Indice de la Revista del Museo Nacional, 1932-1947 (tomos I a X)." *Boletín Bibliográfico*, Año 22, Nos. 1-2, pp. 29-79. Lima, 1949.

Ferdon, Edwin N., Jr. "Studies in Ecuadorian Geography." *School of American Research, Monographs*, No. 15, 86 pp. Santa Fe, 1950.

Garrido, José Eulógio. "Una visita a Santiago de Chuco." *Revista Geográfica Americana*, Vol. 31, No. 187, pp. 154-60. Buenos Aires, 1949.

Ghisletti, Luís V. "El enigma de las representaciones rupestres." *Universidad Nacional de Colombia*, No. 12, pp. 117-39. Bogotá, 1948.

Giesecke, Alberto A. "Los primeros anos del Museo Arqueológico de la Universidad del Cuzco, hoy Instituto Arqueológico del Cuzco." *Revista del Instituto y Museo Arqueológico*, Segunda época, Año 7, No. 12, pp. 36-44. Cuzco, 1948.

Hagen, Victor W. von. "A Guide to Cuzco." *Regional Guides to Peru*, No. 1, 32 pp. New York, 1949.

Hagen, Victor W. von. "A Guide to Machu Picchu." *Regional Guides to Peru*, No. 3, 33 pp. New York, 1949.

Hagen, Victor W. von. "A Guide to Sacsahuaman, the Fortress of Cuzco." *Regional Guides to Peru*, No. 2, 16 pp. New York, 1949.

Harcourt, Raoul d'. "Archéologie d'Esmeraldas et de Manabí, Equateur, Note complémentaire." *SAP-J*, n.s., Vol. 37, pp. 319-325. 1948.

Harcourt, Raoul d'. "Archéologie de la région de Viacha, Bolivie." *SAP-J*, n.s. Vol. 37, pp. 343-4. 1948.

Harcourt, Raoul d'. "Un tapis brodé de Paracas, Pérou." *SAP-J*, n.s., Vol. 37, pp. 241-57. 1948.

Harcourt, Raoul d'. "Tressages de frondes a Nazca." *SAP-J*, n.s., Vol. 38, pp. 91-9. 1949.

Heredia y Soto, Florencio Daniel. *Informe arqueologico de Kcollkce-Wairachina, Paucar-Cancha y Atas-Kcasa, en el cerro de Pachatusan, Cusco.* 55 pp. Cuzco, 1948.

Horkheimer, Hans. *El Perú prehispánico. Intento de un manual.* Vol. 1, 293 pp. Lima, 1950.

Huapaya Manco, Cirilo. "Nuevo tipo de tumba descubierto en las Necrópolis de Ancón." *Revista del Museo Nacional de Antropología y Arqueología*, Vol. 2, No. 1, pp. 93-8. Lima, 1948.

Huerta, R. "Bibliografía onomástica sobre la arqueología de Esmeraldas, especialmente de 'La Tolita.'" *BICN*, Vol. 2, No. 17, pp. 58-63. 1949.

Idovro, L. Ignacio. "Breve relato de las excavaciones efectuadas en Guapán, Cantón Azogues, Prov. de Cañar." *Anales de la Universidad de Guayaquil*, Año 1, Vol. 1, pp. 384-5. Guayaquil, 1949.

Imbelloni, José. "Cephalic Deformations of the Indians of Argentina." *Handbook of South American Indians, BAE-B*, No. 143, Vol. 6, pp. 53-5. Washington, 1950.

Iribarren Charlín, Jorge. "Casa de Piedra en San Pedro Viejo (Refugio primitivo de un pueblo de cultura pre-cerámica)." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 12-13. La Serena, Chile, 1949.

Iribarren Charlín, Jorge. "Una interesante colección arqueológica de Ovalle." *Universidad Católica de Chile, Revista Universitaria*, Año 34, No. 1, pp. 185-92. Santiago, 1949.

Iribarren Charlín, Jorge. "Paradero indígena del Estero de las Peñas, Ovalle, provincia de Coquimbo." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 14-16. La Serena, Chile, 1949.

Karsten, Rafael. "A Totalitarian State of the Past, The Civilization of the Inca Empire in Ancient Peru." *Societas Scientarum Fennica, Commentationes Humanarum Litterarum*, Vol. 16, No. 1, 288 pp. Helsingfors, 1949.

Kosok, Paul, and Maria Reiche. "Ancient Drawings on the Desert of Peru." *Ar*, Vol. 2, No. 4, pp. 206-15. 1949.

Krickeberg, Walter. *Felsplastik und Felsbilder bei den Kulturvölkern Altamerikas, mit besonderer Berücksichtigung Mexicos.* Band 1: *Die Andenländer*; Band 2: *Die Felsen Tempel in Mexico.* Berlin, 1949.

Kroeber, A. L. "Art Styles in Prehistoric Peru." In: *Some Educational and Anthropological Aspects of Latin America, Latin American Studies*, No. 5, pp. 56-79. Austin, 1948.

Kroeber, A. L. "A Local Style of Lifelike Sculptured Stone Heads in Ancient Peru." *Beiträge zur Gesellungs—und Völkerwissenschaft, Festschrift zum achtzigsten Geburtstag von Professor Richard Thurnwald*, pp. 195-8. Berlin, 1950.

Kutscher, Gerdt. *Chimu: eine altindianische Hochkultur.* 112 pp. Berlin, 1950.

Kutscher, Gerdt. "Iconographic Studies as an Aid in the Reconstruction of Early Chimu Civilization." *NYAS-T*, Vol. 16, No. 6, pp. 194-203. 1950.

Kutscher, Gerdt. "Max Uhle zum Gedächtnis." *Ibero-Amerikanisches Archiv*, Jahrgang 18, Heft 1-2, pp. 1-8. Berlin, 1944.

Kutscher, Gerdt. "Sakrale Wettläufe bei den frühen Chimu (Nord-Peru)." *Beiträge zur Gesellungs- und Völkerwissenschaft, Festschrift zum achzigsten Geburtstag von Professor Richard Thurnwald*, pp. 209-26. Berlin, 1950.

Lewis, B. R. "Preliminares de una investigación arquelógica." *Memoria de la Sociedad de Ciencias Naturales La Salle*, Año 9, No. 23, pp. 35-40. Carácas, 1949.

Lichy, René and Mare de Civrieux. "Petroglifos precolombinos en la Piedra Culimacari del bajo Casaquiare." *El Farol*, Año 10, No. 120, pp. 22-4. Carácas, 1949.

Linné, Sigvald. "Kerus: Inca Wooden Cups." *Ethnos*, Vol. 14, Nos. 2-4, pp. 118-39. Stockholm, 1949.

Llanos, Luís A. "Tampu." *Boletín de la Sociedad Científica del Cuzco.* Año, Vol. 1, pp. 3-23. Cuzco, 1949.

Mariátegui Oliva, Ricardo. "Arquitectura peruana precolombina." *Publicaciones del Instituto de Investigaciones de Arte Peruano y Americano, Documentos de Arte Peruano*, No. 8, 56 pp. Lima, 1949.

Mariátegui Oliva, Ricardo. "Cerámica peruana mochica y nazca." *Publicaciones del Instituto de Investigaciones de Arte Peruano y Americano, Documentos de Arte Peruano*, No. 7, 32 pp. Lima, 1949.

Mejía Xesspe and M. Toribio. *Reconstrucción de la vida de los primitivos pueblos del antiguo Perú, a base de los conocimientos arqueológicos y la suerte de los indios después de la conquista española.* 16 pp. Lima, 1949.

Montell, Gösta. "A new Acquisition of Peruvian Pottery." *Ethnos*, Vol. 13, Nos. 3-4, pp. 103-10. Stockholm, 1948.

Mostny, Greta and C. Montt. "Ciudades atacameñas." *Boletín del Museo Nacional de Historia Natural*, Vol. 24, pp. 125-211. Santiago, 1949.

O'Neale, Lila M., E. Bacon, and others. "Chincha Plain-weave Cloths." *AR*, Vol. 9, No. 2, pp. 127-46. 1949.

Onorato, Ettore. "Descrizione del sambaqui da Cabeçuda." *Rivista di Antropologia*, Vol. 35, pp. 349-50. Rome, 1944-47.

Palavecino, Enrique. "Máscaras de piedra del N. O. Argentino." *Universidad Nacional de La Plata, Notas del Museo de la Plata*, Vol. 14, *Antropologia*, No. 54, pp. 211-20. La Plata, 1949.

Pardo, Luís A. "Dos fortalezas antiguas poco conocidas: Huaccrapucara y Molloccahua." *Revista del Instituto y Museo Arqueológico*, Segunda época, Año 7, No. 12, pp. 3-23. Cuzco, 1948.

Pardo, Luís A. "Primer centenario del Museo Arqueológico de la Universidad del Cuzco." *Revista del Instituto y Museo Arqueológico*, Segunda época, Año 7, No. 12, pp. 121-134. Cuzco, 1948.

Paulotti, O., E. Molina, and C. Visuara. "Contribución a la craneología de Catamarca (República Argentina)." *Revista del Instituto de Antropología*, Vol. 4, pp. 249-68. Tucumán, 1949.

Recúpero, María Luisa. "Algunos ejemplares de alfarería de Tucumán." *Revista del Instituto de Antropología*, Vol. 4, pp. 197-212. Tucumán, 1949.

Reiche, María. *Los dibujos gigantescos en el suelo de las pampas de Nazca y Palpa, Descripción y ensayo de interpretación.* 61 pp. Lima, 1949.

Reiche, María. *Mystery on the Desert, A Study of the Ancient Figures and Strange Delineated Surfaces seen from the Air near Nazca, Peru.* 24 pp. Lima, 1949.

Reiche, María. "Orientaciones astronómicas de algunas paredes de Pachacamac y Cajamarca." *Letras*, No. 43, pp. 273-83. Lima, 1949.

Reichel-Dolmatoff, Gerardo. "Bibliografía etnológica del Departamento del Magdalena." *Divulgación Cultural del Instituto Etnológico del Magdalena*, No. 3, 27 pp. Santa Marta, Colombia, 1949.

Reichlen, Henry, and Paule Reichlen. "Recherches archéologiques dans les Andes de Cajamarca, Premier rapport de la Mission Ethnologique Francaise au Pérou Septentrional." *SAP-J*, n.s., Vol. 38, pp. 137-74. 1949.

Requena, Antonio. "Figuración en alfarería antropomorfa precolombina venezolana de aparatos de deformación craneana artificial e intencional." *Acta Venezolana*, Vol. 2, Nos. 1-4, pp. 24-35. Carácas, 1946-47.

Rohmeder, Guillermo. "Estudio de un pre-hispánico camino de cuesta por la Sierra de Famatina (Prov. de La Rioja) (Estudio arqueo-geográfico)." *Revista del Instituto de Antropología*, Vol. 4, pp. 84-93. Tucumán, 1949.

Rowe, John Howland. "The Idahaez: Unknown Indians of the Choco Coast." *KAS-P*, No. 1, pp. 34-44. 1950.

Schaedel, Richard P. "The Callejón de Huaylas of Peru and its Monuments." *Ar*, Vol. 1, No. 4, pp. 198-202. 1948.

Schaedel, Richard P. "Monolithic Sculpture of the Southern Andes." *Ar*, Vol. 1, No. 2, pp. 66-73. 1948.

Schaedel, Richard P. "Uncovering a Frieze on the Peruvian Coast." *Ar*, Vol. 2, No. 2, pp. 73-5. 1949.

Schaedel, Richard P. "Visión panorámica de la litoescultura de la región andina." *Revista de la Universidad Nacional de Trujillo*, II. época, No. 4, pp. 39-53. Trujillo, Peru, 1948.

Segura Núñez, Vicente. "Waka Pando." *Revista del Museo Nacional de Antropología y Arqueología*, Vol. 2, No. 1, pp. 89-92. Lima, 1948.

Sociedad Arqueológica de La Serena. "Proyecto de ley en defensa de la riqueza arqueológica de Chile confecciona la Sociedad Arqueológica de La Serena." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 25-6 La Serena, Chile, 1949.

Stewart, T. Dale. "Deformity, Trephining, and Mutilation in South American Indian Skeletal Remains." *Handbook of South American Indians, BAE-B*, No. 143, Vol. 6, pp 43-8. Washington, 1950.

Stewart, T. Dale. "Pathological Changes in South American Indian Skeletal Remains." *Handbook of South American Indians, BAE-B*, Vol. 6, No. 143, pp. 49-52. Washington, 1950.

Trimborn, Hermann. "Vergessene Königreiche, Studien zur Völkerkunde und Altertumskunde Nordwest-Kolumbiens." *Kulturgeschichtliche Forschungen*, No. 2, 262 pp. Braunschweig, 1948.

Ubbelohde-Doering, Heinrich. *Auf den Königsstrassen der Inka, Reisen und Forschungen in Peru*. 360 pp. Berlin, 1941.

Ugarriza Arnoz, Manuel de, and F. L. Cornely. "Correspondencia (Diaguitas chilenos?)." *Publicaciones de la Sociedad Arqueológica de La Serena, Boletín*, No. 4, pp. 20-4. La Serena, Chile, 1949.

Uhle, Max. "Grausamkeiten und Menschenopfer in den alten Kulturen Perús." *Ibero-Amerikanisches Archiv*, Jahrgang 18, Heft 1-2, pp. 32-53. Berlin, 1944.

Uriondo, Mario Ernesto. "Estatuitas humanas del noroeste argentino." *Revista del Instituto de Antropología*, Vol. 4, pp. 173-96. Tucumán, 1949.

Valcárcel, Luís E. "Arqueología de Huari (Peru)." *SAP-J*, n.s., Vol. 38, p. 186. 1949.

Valcárcel, Luís E. *Historia de la cultura antigua del Perú*. Vol. 1, Pt. 2, 245 pp. Lima, 1949.

Venezuela. "Ley de protección y conservación de antigüedades y obras artísticas de la nación." *Acta Venezolana*, Vol. 2, Nos. 1-4, pp. 160-2. Carácas, 1946-47.

Wassén, Henry. "Tre föremal fran Patacas, Peru." *Göteborgs Musei Arstryck*, 1949 och 1950, pp. 213-222. Göteborg, 1950.

Wethey, Harold E. *Colonial Architecture and Sculpture in Peru*. 332 pp. Cambridge, 1949.

Zimmern, Nathalie H. *Introduction to Peruvian Costume*. 62 pp. The Brooklyn Museum, Brooklyn, 1949.

EASTERN SOUTH AMERICA

Barata, Frederico. "A arte oleira dos Tapajó. I. Considerações sobre a cerâmica e dois tipos de vasos característicos." *Instituto de Antropologia e Etnologia do Pará, Publicação*, No. 2, 47 pp. Belem, Brazil, 1950.

Bórmida, Marcelo. "Un clásico yacimiento de Patagonia, informe preliminar sobre la expedición a la zona de la Laguna del Juncal. (Julio-agosto, 1948)." *BBAA*, Vol. 11, pp. 66-72. 1949.

Bórmida, Marcelo. "Sepultura colectiva bajo roca en la Patagonia austral." *Runa*, Vol. 2, Nos. 1-2, pp. 148-55. Buenos Aires, 1949.

Bórmida, Marcelo. "Un silbato de concha procedente del Territorio de Río Negro." *Runa*, Vol. 2, Nos. 1-2, pp. 213-17. Buenos Aires, 1949.

Cruxent, J. M., and Mauricio Kamen-Kaye. "Reconocimiento del área del Alto Orinoco, ríos Siapo y Autana, en el Territorio Federal Amazonas, Venezuela." *SCN-M*, Vol. 9, No. 25, pp. 271-317. 1949.

Hauenschild, Jorge von. "Ensayo de clasificación de la documentación arqueológica de Santiago del Estero." *Revista de la Universidad Nacional de Córdoba*, Año 36, No. 1, pp. 19-94. Córdoba, Argentina, 1949.

Hauenschild, Jorge von. "La técnica de la alfarería arqueológica de Santiago del Estero." *Publicaciones de la Sociedad Argentina de Americanistas*, Vol. 1, *Arqueología*, No. 1. Buenos Aires, 1949.

Palavecino, Enrique. "Areas y capas culturales en el territorio argentino." *Gaea*, Vol. 8, pp. 447-523. Buenos Aires, 1948.

Palavecino, Enrique. "Noticia preliminar sobre un viaje arqueológico a Goya." *Universidad Nacional de La Plata*, Vol. 13, *Arqueología*, No. 53, pp. 253-7. La Plata, 1948.

Palmatary, Helen C. "The Pottery of Marajó Island, Brazil." *APS-T*, n.s., Vol. 39, Pt. 3, pp. 261-470. 1950.

Pertierra y Polo, Roberto A. "Una Corneta Humahuaquense, Contribución a la Arqueología Argentina." *Americanista*, Año 1, No. 1, pp. 14-17. 1950.

EARLY MAN

Aveleyra, Luis. "El Hombre de Tamazulapan." *Memorias de la Academia Mexicana de la Historia*, Vol. 7, No. 3, pp. 3-15. Mexico, 1948.

Baldwin, Gordon C. and David L. Heib. "A Folsom Point from Southeastern Wyoming." *SL*, Vol. 16, No. 1, pp. 11-13. 1950.

Cook, Sherburne F. "Physical Analysis as a Method for Investigating Prehistoric Habitation Sites." *UCAS-R*, No. 7, pp. 2-5. 1950.

Frenguelli, Joaquín. "The Present Status of the Theories Concerning Primitive Man in Argentina." *Handbook of South American Indians, BAE-B*, No. 143, Vol. 6, pp. 11-17. Washington, 1950.

Giddings, J. Louis. "Traces of Early Man on the North Bering Sea Coast." *University Museum Bulletin, University of Pennsylvania*, Vol. 14, No. 4, pp. 3-13. Philadelphia, 1950.

Heizer, Robert F. "Observations on Early Man in California." *UCAS-R*, No. 7 and *KAS-P*, No. 1, 6 pp. 1950.

Heizer, Robert F. "On the Methods of Chemical Analysis of Bone as an Aid to Prehistoric Culture Chronology." *UCAS-R*, No. 7, pp. 10-14. 1950.

Hunt, Alice P. "Artifacts Associated with Pleistocene Deposits in the Denver Area, Colorado." *PAC-NL*, Vol. 3, No. 3, pp. 7-9. 1950.

Hunt, Charles B. "Progress in Mapping Late Pleistocene and Recent Deposits in the Denver Area." *PAC-NL*, Vol. 3, No. 2, p. 10. 1950.

Jennings, Jesse D. "On the Validity of Tepexpan Man." *TAPS-B*, Vol. 21, pp. 105-10. 1950.

McCown, Theodore D. "The Antiquity of Man in South America." *Handbook of South American Indians, BAE-B*, Vol. 6, No. 143, pp. 1-9. Washington, 1950.

MacGowan, Kenneth. *Early Man in the New World*. 260 pp. New York, 1950.

Maldonado-Koerdall, Manuel. "Antecedentes del Descubrimiento del Hombre de Tepexpan." *Anthropos*, Vol. 1, No. 1, pp. 1-4, Mexico, 1947.

Maldonado-Koerdall, Manuel. "Los Vertebrados Fosiles del Cuaternario en Mexico." *Revista de la Sociedad Mexicana de Historia Natural*, Vol. 9, No. 1-2, pp. 1-35. Mexico, 1948.

Maldonado-Koerdall, Manuel. "Las Industrias Prehistoricas de Mexico." *INAH-A*, Vol. 3, pp. 9-16. 1949.

Roberts, F. H. H., Jr. "The Early Americans." *SA*, Vol. 184, No. 2, pp. 15-19, 1951.

Rouse, Irving. "Vero and Melbourne Man: A Cultural and Chronological Interpretation." *NYAS-T*, Vol. 12, No. 7, pp. 220-4. 1950.

Shutler, Dick, Jr. "The Dry Creek Site: A Pre-Pottery Lithic Horizon in the Verde Valley, Arizona." *P*, Vol. 23, No. 1, pp. 6-10. 1950.

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